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URINARY HYPERACIDITY AND ITS RELATION TO NEURITIS, NEURALGIA AND MYALGIA.

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The etiology of neuritis, neuralgia and myalgia has always been difficult to determine, although we recognize in certain types of cases various causative factors. Thus, for example, in neuritis the only assignable origin in a certain proportion of cases is some poison, introduced into the body from without, or produced within, either due to the action of microorganisms or to defective metabolism. We cannot fail to recognize that many poisons, very different in nature and chemical constitution, show a peculiar tendency to affect the peripheral nerves. In some of these cases other symptoms of poisoning or autointoxication are present, but in a group of cases the only symptoms seem to be the effect of these toxins upon the peripheral nerves. Among the etiological factors may be mentioned metallic poisons, as lead and arsenic, carbon monoxide, alcohol, various drugs, as aniline compounds and sulphonal, and the ptomaines and leucomaines; the toxins produced by fevers, as scarlet fever, diphtheria, typhoid fever, and other infections and poisons in various diseases especially affecting metabolism, as diabetes; affections associated with cachexia, malnutrition and anæmia, where in all probability the resistance of the nerve is lowered, and cold.

When we consider the etiology of neuralgia and myalgia we find very similar factors—various toxins, exogenous or endogenous, conditions of malnutrition and anæmia, cold, organic diseases of the nervous system, some systemic diseases, especially those of the circulatory apparatus, and direct trauma of the nerves or muscles. We must not forget that certain cases, considered as neuralgia or myalgia, are probably in reality mild case of neuritis. There is unquestionably a distinct hereditary predisposition in a certain proportion of all these cases. Certainly in myalgia, and possibly in neuralgia, the feeling is that in a certain number of cases there seems to be a peculiar susceptibility in members of rheumatic or gouty families.

It is not our purpose to discuss the etiology of neuritis, neuralgia and myalgia *in toto*, but simply to call attention to certain interesting features especially in regard to the chemistry of the urine in that group which from lack of definite causative factors can be spoken of as idiopathic. In this discussion while we recognize that these conditions shade imperceptibly into each other; how, for example, many regard neuralgia as a mild neuritis, and others regard myalgia either as a neuritis or a neuralgia, we shall use the terms in the ordinarily accepted sense, and define neuritis as a definite inflammation of the nerve *with* demonstrable signs of inflammation; neuralgia as a pain strictly confined to a nerve or group of

nerves *without* demonstrable signs of inflammation; and myalgia as more diffuse pain affecting certain muscles, or groups of muscles, probably due to changes in their fibrous constituents.

We wish to present a group of cases of neuritis, neuralgia and myalgia, in which the examination of the urine showed a marked increase of acid; to suggest that this is probably due to disturbances of metabolism, and that the pain represents a symptom of autointoxication; and to note that in certain of these cases the administration of alkalies with the consequent diminution of the acidity is associated with marked improvement in the symptoms.

While the acidity of the urine varies within quite considerable limits in health, broadly speaking we may say that when expressed in terms of deci-normal sodium hydroxide solution it is 25, that is, it takes 25 cc. of deci-normal sodium hydroxide solution to neutralize 100 cc. of urine, phenolphthalein being used as the indicator. A number of years ago we made between 100 and 125 observations on normal human beings, and arrived at these figures, which subsequently have been confirmed by other investigators in this field (Hastings); in certain of the text-books of clinical diagnosis (Wood) as well, .25 is given as the average urinary acidity. Of course, this is markedly dependent upon the specific gravity of the urine, which, in turn, is influenced by the exercise taken, and the amount and character of the ingesta; it is lower, often markedly so, when the specific gravity is diminished, as after the ingestion of large amounts of water, and is higher when the specific gravity is increased by the ingestion of too little water, or by an augmented loss of water from the skin or bowels; but under normal conditions, the patient passing about 1500 cc. daily with an average specific gravity of 1.015, the usual acidity is 25 or thereabouts.

In making our observations we examined, as a rule, the early morning specimens, as these probably represent more closely the average urine of the 24 hours than specimens obtained at any other time of the day, and also because, by this means, we can more easily make our examinations shortly after the urine has been voided.

Consideration of Cases.

The series we wish to report comprises 44 cases classified as follows: 5 cases of neuritis, 2 of sciatica, 8 of neuralgia, 11 of neuralgic headache, 5 of lumbago, 1 of torticollis, 23 of myalgia. There were 14 males and 30 females. The youngest case was 16, the oldest 55; no decade predominated.

As regards hereditary predisposition four gave a family history of gout, one of tuberculosis, one of diabetes, one of rheumatism, one of arterio-sclerosis and cerebral hæmorrhage, and one of myalgia and neuralgia. Two of the cases (17 and 19) were sisters, while one (28) was the daughter of two others (16 and 35). It would seem from a consideration of these figures that heredity played a very minor rôle in these conditions.

The digestion and the general habits were good in the great majority of cases; 10 complained of indigestion, either gastric or intestinal, and 10 of constipation, while three used tobacco extensively, six alcohol in considerable amount and five admitted being careless and rapid eaters.

Whether the conditions may be regarded as an expression of a gouty or lithæmic tendency or diathesis is uncertain as six only of the 44 cases could be considered clinically in this category (11, 14, 20, 26, 39, 44).

The hæmoglobin was above 85 per cent in all the cases in which it was taken—a great majority of the 44—with the exception of three (31, 34, 40), in which it was 60, 74 and 70 per cent, respectively. All cases with facial neuralgia or neuralgic headache were especially questioned regarding the condition of their eyes. If there was any suggestion of visual disturbance an oculist was consulted, but in almost all these cases, in fact, with only one or two exceptions, that possibility had already been considered by the patient, and the proper glasses obtained without relieving the symptoms. In the case of the women the suffering was often increased at the menstrual period, at which time, of course, metabolic disturbances are likely to be increased, while in two of the cases the disease came on at the menopause.

It would seem, therefore, that the great majority of these cases developed neuritis, neuralgia and myalgia, not as a result of hereditary predisposition, or indiscretions in diet, exposure to cold or trauma, but from some indefinite cause, as far as we could determine. It, therefore, seems justifiable to regard these cases as idiopathic in origin, and due to a disturbance in metabolism, probably to some circulating toxin, manifesting itself clinically in the production of pain in the affected group of nerves or muscles, associated with an increase in the urinary acidity.

The Urinary Acidity in these Cases.

The acidity was quantitatively determined in each examination, as previously described, from fresh morning specimens. In this series 43 of the 44 cases gave readings, ranging from 35 to 138, and of these 36 had an acidity of 50 or above, 16 of 75 or above, six of over 100, and two of over 125. The average acidity of these 44 cases, which with recurrences furnished 52 readings, was 69.1, that is, nearly three times the normal, 25, as expressed in terms of deci-normal sodium hydroxide solution.

The inspection of our table of cases, however, will demonstrate that the majority show an increase of the specific gravity, and, therefore, it will be fairer to reduce them to a basis of a specific gravity of 1.015, in other words, to determine the acidity if the urine voided were of sufficient dilution to be of the normal degree of density. In 34 of the 44 cases the specific gravity was taken, and the correction made; that is, bringing them to a specific gravity of 1.015 gave an average acidity of 51.5, which shows that although the tendency is to have a urine of higher specific gravity, there is, nevertheless, a real and considerable increase in the acid, the average being a little more than double the normal. In this connection we have assumed that the total amount of solids excreted is the same as under normal conditions, or, in other

REPORT OF CASES.

No.	Diagnosis.	Urinary Acidity and Specific Gravity.	Urinary Acidity Corrected to Sp. Gr. of 1.015.	P. H. = Past History. F. H. = Family History.
1.	Neuritis: r. brachial and circumflex, severe type, followed by disuse and atrophy	115	....	P. H.—Neuralgia and sciatica several years ago—severe one year ago. (Urinary acidity = 60).
2.	Neuritis: r. brachial	50—1.020	37.5	F. H.—Gout (maternal side)
	Recurrence in 7 months	69—1.017	60.9	P. H.—Hard worker, light eater, smokes and drinks in moderation.
3.	Neuritis: l. brachial	69—1.017	60.9	P. H.—Very small eater.
4.	Neuritis: severe r. brachial, ulnar, and circumflex	75—1.015	75	P. H.—Considerable exposure to cold.
5.	Neuritis: severe r. brachial	59—1.022	40.0	P. H.—Much worry. Obesity.
6.	Myalgia: thigh. Neuralgia: leg	61—1.017	53.8	F. H.—Father died of tuberculosis. P. H.—Very small eater, very nervous.
7.	Neuralgia: facial. Myalgia: back	49—1.018	40.8	F. H.—Nervous.
	Recurrence in 4 months	46—1.016	43.1	P. H.—Eczema, attacks of purpura hæmorrhagica.
8.	Neuralgia: arms	51—1.015	51	F. H.—Mother had gout. P. H.—Always nervous, careless eater, drinks considerably at times.
9.	Myalgia: diffuse	51—1.009	85	
10.	Myalgia: shoulder and back	50	....	
11.	Neuralgia: facial. Myalgia	65	....	P. H.—Very neurotic. Constipated.
	Recurrence in 6 weeks	51	....	
12.	Sciatica: left. Lumbago	135	....	Very nervous. Pain in lower back for years.
13.	Myalgia: diffuse. Neuralgic headache	98—1.025	58.8	
14.	Myalgia: diffuse	54	....	P. H.—Alcohol and tobacco in large amounts. Large eater. Constipated. Hard worker.
15.	Lumbago	57—1.015	57	P. H.—Constipated. Gout. Nervous strain.
16.	Myalgia and neuralgic headache	91—1.026	52.5	F. H.—Father had gout. P. H.—Hard worker, careless eater. Has had attacks of epigastric pain and nausea.
17.	Neuralgic headache: severe myalgia of back	68	....	F. H.—Arterio-sclerosis. P. H.—Careless eater, alcohol in considerable amounts. Constipated. Nervous.
18.	Myalgia: diffuse	49	....	Has epilepsy.
19.	Lumbago	49—1.018	40.8	Menopausal nervousness.
20.	Myalgia: severe, diffuse	88	....	F. H.—Father has diabetes.
	Return of symptoms one year later	101—1.028	54.1	P. H.—Scarlet fever twice. Large, rapid eater.
21.	Neuralgic headache. Myalgia: diffuse	138—1.027	76.6	P. H.—Scarlet fever once. Constipated. Considerable indigestion. Neurasthenia and psychasthenia.
22.	Myalgia: diffuse	85—1.025	51	P. H.—Neurasthenia.
23.	Myalgia: back and legs	55—1.018	45.8	P. H.—Chronic intestinal indigestion.
24.	Myalgia: severe, diffuse	75—1.028	40.2	P. H.—Nervous indigestion. Constipation.
25.	Myalgia	79—1.029	40.9	P. H.—Occasional attacks of acute epigastric pain.
26.	Myalgia: severe, diffuse	99—1.027	55	P. H.—Menopausal nervousness. Obesity.
27.	Torticollis	70	....	P. H.—Tonsillitis as a child. Malaria one year before. Considerable nervous strain.
28.	Sciatica	66—1.018	55	F. H.—Father, Case 16. Mother, Case 35.
	Recurrence in 2 months	55—1.017	48.5	
29.	Myalgia: severe, diffuse	75	....	F. H.—Gout on both sides.
	Recurrence in 8 months	105—1.028	56.3	P. H.—Double ovariotomy 2 years ago. Has distinct beginning gouty deposits in fingers.
	Recurrence in 3 months	75	....	
	Recurrence in 2 months	74	....	
30.	Neuralgic headache	13—1.012	16.3	F. H.—Mother had rheumatism. P. H.—Neurasthenia and nervous dyspepsia.
31.	Myalgia. Neuralgic headaches	78—1.026	45	P. H.—Splanchnoptosis. Hæmoglobin 60%. Indigestion.
32.	Neuralgia: face and arms	80—1.030	40	P. H.—Repeated attacks of tonsillitis.
33.	Myalgia: diffuse	35—1.005	105	
34.	Neuralgic headaches: severe for many years	49—1.015	49	P. H.—Indigestion (hyperchlorhydric). Constipation. Hæmoglobin 74%.
35.	Myalgia: diffuse	53—1.021	37.1	P. H.—Constipation. Nervousness.
36.	Neuralgic headaches. Lumbago	60	....	P. H.—Nervous. Constipated. Hard brain worker.
37.	Neuralgia: facial	60	....	
38.	Neuralgic headaches	70—1.019	55.3	P. H.—Very hard worker, physically and mentally. Splanchnoptosis.
39.	Myalgia	73	....	P. H.—Eats carelessly. Drinks moderately. Hypertrophied heart, and anginoid attacks.
40.	Neuralgia: facial, severe repeated attacks of. Headaches	105	....	P. H.—Constipation. Hæmoglobin 65%.
41.	Attacks of neuralgic headache, followed by digestive disturbances	51—1.024	30.5	P. H.—Digestion poor. Used tobacco immoderately, and alcohol moderately.
42.	Neuralgia: facial	45—1.018	37.5	P. H.—Constipated. Some indigestion. Previously operated on for appendicitis.
43.	Lumbago	48—1.014	51.4	P. H.—Neurasthenia. Pruritus.
44.	Myalgia	75	....	P. H.—Eczema and pruritus.

words, that the quantity varies inversely with the specific gravity, but more than likely this is not the case, as the solids are probably increased in this group of cases, and, therefore, the total acidity is doubtless higher than the figure given, 51.5.

Increased acidity of the urine is met with in other conditions, and we have described 20 or more cases (Philadelphia Medical Journal, March 2, 1901, New York Medical Journal, March 14, 1903) where the effect of this was to produce symptoms very suggestive of cystitis, notably pain in the bladder and on urination, conditions entirely absent in the present group of cases.

Just why in some instances the brachial nerve, in others certain muscles, and in still others the nerves of the bladder should be selected by the circulating poison or toxin as the source of the signs and symptoms of the individual case we find it impossible to say, but in all probability there have been certain causes in the past history of the patient, which have lowered the resistance of that portion of the body affected.

The Relation of Urinary to Gastric Acidity.

The question may well be asked what is the cause of this increase in the urinary acidity; and does it bear any relation to the acidity of the gastric juice, or is it due to errors in metabolism arising elsewhere? In our series of 44 cases we took test meals in nine, comparing the analysis of the test meal with the specimen of urine obtained at the same time. A study of these cases would seem to show that there is no definite relationship here between the urinary and gastric acidity.

Case	Urinary Acidity.	Corrected to sp. gr. 1.018	Test Meal Free HCl—Total Acid
16	91—1.026	52.5	59—75
19	49—1.018	40.8	0—..
21	138—1.027	76.6	35—50
24	75—1.028	40.2	20—52
25	79—1.029	40.9	43—76
32	80—1.030	40.0	0—22
34	49—1.015	49.0	52—72
41	51—1.024	31.9	0—15
42	45—1.018	37.5	39—63

In nine instances the urinary acidity varied from 45 to 138 or (corrected to a specific gravity of 1.015) from 31.9 to 76.6; the free HCl from 0 to 59, the total acid from 15 to 76, these figures also being expressed in terms of deci-normal sodium hydroxide solution. Of these nine, three had no free HCl; in three the free HCl was between 20 and 40; and in three between 40 and 60. While these are, of course, far too few in number to furnish definite and final conclusions, nevertheless, they suggest that there is little or no relationship between urinary and gastric acidity. It, therefore, seems probable that the urinary hyperacidity met with in these cases is due to metabolic disturbances arising elsewhere, possibly to derangement in the functions of certain of the ferments in the liver or intestines.

It is, of course, quite possible that these cases simply represent a form of atypical gouty manifestation, or a lithæmic tendency. It is worth remembering that in gout and diabetes, with their deranged metabolism, where neuritis and neuralgia are frequent, there is a distinct tendency towards increased acid production, or acid elimination. This naturally suggests that any condition which has as its especial characteristic an increase in the amount of acid produced would seem to possess a peculiar tendency to show symptoms in the nervous tissues, which in turn seem to be peculiarly vulnerable to acids, whatever their chemistry or source of origin.

Treatment.

The treatment of these cases was extremely suggestive along certain lines. In all the cases, believing we were dealing with disturbances of metabolism and that as a consequence toxins were being formed, which in their circulation produced definite lesions or disturbances in certain nerves or muscles, we insisted upon a simple dietary and the drinking of water in considerable amounts; and basing our treatment purely on the urinary findings, we administered alkalies to all in sufficient amount to reduce the urinary acidity to or below normal. It might be well to mention in this connection that in some patients enormous quantities were necessary to bring about this result; thus in a case of very stubborn sciatica of many years' duration, the administration of one ounce of alkali daily for four weeks reduced the acidity of the urine from 138 to only 89, while in many it was necessary to give from half an ounce to an ounce of alkali daily for two or three weeks before the acidity reached rormal.

The alkalies given were usually bicarbonate or citrate of soda, carbonate of lithium, and bicarbonate of potash, while if constipation were present calcined magnesia was frequently added.

In some instances the administration of sufficient alkali with the simple dietary and the drinking of large amounts of water was the entire treatment; and in 17 of the 44 cases (1, 2, 3, 7, 9, 10, 14, 16, 22, 24, 25, 26, 28, 31, 34, 37, 39) the cure was effected by this means with little or no additional treatment, but in some other cases it was found necessary to use different therapeutic agents, such as aspirin, coal-tar derivatives, the salicylates, or even opiates occasionally, the paquelin cautery, and the application of heat or cold.

It seems worth while to mention a few of the cases in detail. Three of the five cases of neuritis obtained almost entire relief in a comparatively short time under this treatment, and one of these (1) had previously been obliged, for between three and four weeks, to take from ½ to 1 grain of morphia daily; the other two cases of neuritis, however, needed sedatives of some kind. One patient (7) with neuralgia and myalgia had noted before he came that his attacks could be stopped by taking large quantities of bicarbonate of soda, while in several of the milder cases (9, 10, 14, 15, etc.) almost complete relief was obtained in a few days' time. In some (14, 20, etc.) it seemed that the regulation of the diet, and the general regimen was really of much greater importance than the administration of alkalies.

That there was an inherent tendency towards this condition was shown by the fact that a number showed a recurrence of

symptoms if the regimen was stopped, though in others it seemed to produce entire relief for long periods of time.

It was possible sometimes to examine the urine after the patient had been under treatment for a certain length of time, and it is interesting to note the decrease in acidity that we obtained. Of 16, whose urine was examined after they were either cured or greatly improved, the average acidity was 21.5, but if the acidity was corrected to a specific gravity of 1.015 the acidity was 24, that is practically normal; the closeness of these figures would suggest that the improvement was not so much due to the dilution of the urine as to the reduction of its acid.

In all suffering from anæmia, iron sometimes combined with arsenic, was given (31, 34, 40) while in one case (41) alkalies had no effect on the pain, but the administration of free HCl to correct the functional anacidity of the stomach was productive of almost immediate beneficial results, and this would suggest that in probably a small proportion of cases the fundamental trouble is the disturbance of gastric secretion.

This study seems to show that the benefit of the thorough alkalinization of the patient in these conditions was often sufficiently striking to warrant its trial.

Whether this beneficial effect shows that the toxins produced are really acid in nature, and are, therefore, neutralized and rendered less harmful by neutralization with alkalies, or whether the effect of increased water drinking, simple diet and alkalies is mainly to improve digestion and stimulate elimination we cannot say, although the former view is certainly suggested by the very rapid and marked improvement met with by the administration of alkalies in a certain proportion of these cases, in some, in fact, to such an extent that it almost suggests an elective action.

CONCLUSIONS.

In this article, very brief and fragmentary as it is, we have shown that in a certain group of cases of neuritis, neuralgia and myalgia, which for want of a better term, and in the absence of definite or sufficient etiological factors may be called idiopathic, there is a definite increase in the acid eliminated, although we have not attempted to determine whether this is due to an increase in the acid phosphates, or in the organic acids. We believe, however, that the latter is more likely, and we hope subsequently to investigate this phase of the subject in detail. For want of a better explanation we make the suggestion that this hyperacidity is probably the urinary expression of some abnormality or error of metabolism, probably having little or no relationship with the gastric digestion or the degree of acid in the gastric contents, but more probably due to metabolic disturbances arising lower down in the digestive tract; and that the pain and other manifestations in the nerves or muscles affected are due to some circulating poison or toxin, the condition thus probably being a form of endogenous intoxication. Why certain groups of nerves or muscles should be selected in some cases, other groups in other cases, we are unable to say, though in all probability there has been something in the past history of the patient as trauma, exposure to cold, etc., which has lowered the resistance of the especial nerve or muscle affected.

Finally it seems certain that in some patients the insistence upon a simple dietary and copious water drinking, and, most important of all, the administration of alkalies in sufficient amount to reduce the acidity of the urine to normal, is followed by a very marked amelioration of symptoms; and in a few by their complete disappearance without the aid of other remedial agents.

AN ANALYSIS OF THE COURSE OF LABOR IN 100 OCCIPUT POSTERIOR PRESENTATIONS.

By CLARENCE B. INGRAHAM, M. D., Denver, Colorado.

In view of the fact that when the occiput occupies a posterior position in the pelvis the condition is commonly supposed to cause considerable difficulty to the progress of labor, and to be of more or less serious consequence to both mother and child, I have collected one hundred consecutive cases, occurring in the obstetrical department of the Johns Hopkins Hospital, in order to show that this variety is to be regarded with but little more anxiety than the more common occiput anterior presentation.

Though the figures of the different observers vary quite markedly, occiput posterior presentations are of frequent occurrence. Pinard and Dubois having found them in 49.8 and 26.23 per cent of their cases; while in this clinic, in a series of cases studied by Dr. Williams, there were 16.8 per cent. This smaller number he attributes to the fact that the examinations were made late in labor when anterior rotation had already occurred. In my series the percentage is still smaller, 12.03 per cent, due probably to the fact that where the least doubt has existed as to the variety of position, the cases have been discarded, and several diagnosed as of transverse variety really belonged in this number.

All the babies in this series were born at term, and those cases with small children were discarded as not being fair examples for comparison in difficult labor. To be sure of the position of the child, in practically every instance, an internal as well as an external examination was made and the variety of position verified.

In looking for a cause of the occurrence of this variety of position, it was found, in this small series at least, that the condition was slightly more common in the contracted pelvis—the number occurring in normal pelves was 85, while in 15 the pelvis was contracted as follows: Generally contracted in

nine, simply flat in two, generally contracted rachitic in one, and funnel pelvis in two cases. The percentage of contracted pelves occurring in the hospital being 13.1 per cent, makes an increase of 1.9 per cent in association with the occiput posterior presentation. Forty-eight of the 100 cases were in multiparæ and 42 in primiparæ. Taking into consideration the cephalic measurements, nothing of importance was gained, the average measurements obtained from the 100 heads being:

	Cm.
Fronto-occipital	11.73
Biparietal	9.38
Bitemporal	7.90
Mento-occipital	13.92
Suboccipito-bregmatic	9.59
Suboccipito-bregmatic circumference	31.80

All of which are seen to be practically normal.

Up to this time, the percentage of operative deliveries at term in the Johns Hopkins Hospital, including posterior positions, is 15.2 per cent, which, though high, is due to the fact that many patients are brought in from outside only because complications have arisen. The number of cases requiring operation in the 100 posterior positions was 18, but slightly higher (2.6 per cent) than that of all cases, and of these 18, 11 were due to causes known to be from conditions other than the posterior position, for example:

	Cases.
Mitral stenosis (patients not allowed to continue in second stage of labor)	2
Contracted pelves	4
Prolapsus of cord	1
Eclampsia	1
Dead infected fœtus	1
Ventral hernia and relaxed abdominal muscles	1
Ankylosis of coccyx	1

Of the remaining seven operative cases, the indications given are as follows:

1—Mid-forceps—R. O. T.—P. Poor pains, in second stage 2 hours and 53 minutes with no advance.

2—Mid-forceps—R. O. P. Fœtal and maternal pulse the indication.

3—Mid-forceps—L. O. T.—P. In second stage 2 hours and 10 minutes. Appearance of mecomium and increased rate of fœtal heart.

4—Mid-forceps.—R. O. T.—P. Relaxed abdominal wall and insufficient vis-a-tergo. Second stage 2 hours and 45 minutes.

5—Mid-forceps—R. O. T.—P. In second stage 3 hours with no advance. Maternal pulse 110 to the minute. Exhaustion.

6—Low-forceps—R. O. P. (Scanzoni application). In second stage for over 2 hours with no advance.

7—Attempted high-forceps—R. O. P. Maternal pulse 130 to the minute. In second stage 3 hours with no advance. Version and extraction. In this case the dystocia seemed to be due almost entirely to the very large size of the child, which was 57 cm. long and weighed 4110 gm. The head measurements were:

	Cm.
O. M.	14.50
O. F.	11.00
Bi-P.	9.50
Bi-T.	8.00
S. O. B.	10.00
S. O. B. circum	32.50

In case four it is doubtful if the variety of position was a factor.

Among these 100 cases, there were seven in which the occiput rotated into the hollow of the sacrum—a condition in which operative interference is quite generally supposed to be necessary; but of these seven, one only required operation, a delivery with low forceps. The remaining six were born readily and spontaneously, the second stage of labor averaging but one hour and two minutes.

In considering the duration of labor for the primiparæ in whom spontaneous anterior rotation occurred, the average was found to be 18 hours and six minutes—the first stage averaging 16 hours and 10 minutes, and the second stage one hour and 42 minutes. For the multiparæ, the average duration was 10 hours and 15 minutes, of which the first stage occupied nine hours and ten minutes, and the second stage 52 minutes.

In the cases in which rotation occurred into the hollow of the sacrum, the labors averaged 14 hours and seven minutes, of which the first stage was 13 hours and the second stage one hour and two minutes. It might be supposed that this condition would require a much longer time, but of these seven cases, five were multiparæ; and unfortunately, with the two cases of primiparæ the time cannot be determined as in one case forceps were applied at the end of two hours, and in the other, the first and second stages were not estimated separately, and both together lasted 10 hours and a half. Also three of the babies were under 3000 grams in weight, the only ones in the series below this figure.

When one compares the duration of labor in this series with that of the various text-books, we find that Williams estimates the first stage as 16 hours, and the second one hour and three-quarters to two hours for primiparæ; and for multiparæ, 12 hours and one hour, respectively. Veit gives the duration of labor as 20 hours for primiparæ, and 12 hours for multiparæ. Varnier, from the records of 2000 cases, one-half of which were primiparæ, estimates it as 13½ and 7½ hours, respectively—the second stage 75 minutes in the former and 35 minutes in the latter. It is seen that, as compared to the times of the first two observers, with this series of occiput posterior presentations the duration is short, while with Varnier's figures it is somewhat longer.

The percentage of perineal tears received during these 100 cases was 26 per cent as against 23 per cent in 200 consecutive cases of the more common anterior variety. Of these 26 perineal tears, 18 were in primiparæ, and eight in multiparæ: 14 of the first and 12 of the second degree. Twelve of the tears were in operative cases, and of these, four were of the first and the remaining eight of the second degree.

Of the seven cases in which the occiput rotated posteriorly there were four tears (55 per cent). This is readily explained when we consider that the vulva, with the more unusual mechanism of labor, is stretched to admit the occipito-frontal diameter of the head (11.75 cm.) instead of the suboccipito-bregmatic diameter (9.5 cm.) in the occiput anterior variety. In the three remaining cases, in which the occiput

rotated posteriorly and there were no perineal tears, the babies were under 3000 grams in weight.

Of the 100 cases there were five fœtal deaths. One baby lived six days with congenital deformity of the viscera and broncho-pneumonia; one had congenital absence of the pylorus and lived a few days; one with status lymphaticus lived 1½ hours after version and extraction; one was practically still-born; with this child, version and extraction was tried through a funnel pelvis and abandoned for a second attempt with the forceps, by which the head was unduly compressed; and one child died through perforation of the head; there was a generally contracted pelvis and a long labor without engagement of the head. Accouchement forcé was done, and an attempt with forceps on the floating head tried, which was unsuccessful. Version and extraction was then resorted to. The head became wedged in the pelvis and perforation of the after coming head became necessary. The conjugata vera measured 10.5 cm., and in this case the method of procedure should have been pubiotomy. Of these deaths, the last two were due to operations dependent upon contracted pelves; in one the pelvis was generally contracted, and in the other funnel shaped. The posterior variety of position cannot be held responsible for either one.

Three other babies were slightly asphyxiated at birth. In one there was a pressure necrosis of the scalp from a contracted pelvis, and in another a facial paralysis followed the application of forceps. Both recovered completely.

In the series there were two maternal deaths—one patient died of typhoid fever during the puerperium, the disease being present at the time of labor; the other lived one day after delivery, and died from chronic myocarditis with dilatation.

In reviewing this rather small series of occiput posterior presentations, it is shown that operative interference need be but little more frequent than in the occiput anterior variety of presentation. The duration of labor is slightly more prolonged and the percentage of perineal tears slightly higher than in the anterior variety. The consequences to the mother and child are, however, not much more serious.

It is the procedure in this clinic, when a posterior variety of position is diagnosed, to leave the condition to nature, when, as is shown in almost the same percentage of cases as in occiput anterior the labor is spontaneous. Many writers advocate turning the head to an anterior variety by means of the hand introduced into the vagina. This procedure renders the patient more liable to infection through manipulation; and while in a certain number of cases, if successful, it may hasten the labor, in the majority, rotation to the symphysis takes place spontaneously (about 92 per cent), and the labor is uncomplicated.

To quote Dr. Williams from his text-book:

"Even when the occiput rotates into the hollow of the sacrum, the prognosis is not so very bad, as in the majority of cases spontaneous labor usually occurs. No doubt, when the occiput remains posterior, there is an increased tendency toward perineal tears, which is particularly marked when the head is born by the less frequent mechanism. But to my mind, the main cause of the dread in which posterior presentations are held is the fact that they frequently escape recognition, and accordingly, if for any reason operative delivery becomes necessary, the forceps is applied improperly—that is, as in occipito-anterior presentations.

"When occipito-posterior presentations have descended into the pelvis, it is my practice to leave them to nature so long as possible, and to interfere only when absolutely necessary. But when convinced that the best interests of the mother and child will be subserved by prompt delivery, forceps should be applied.

"On the other hand, when the head is arrested at the superior strait in a posterior position, version should be resorted to as soon as one is convinced that spontaneous advance will not occur, provided of course, that the operation is feasible and is not contraindicated by disproportion between the size of the head and the pelvis."

As regards the application of forceps, when the occiput has rotated into the hollow of the sacrum and interference becomes necessary, the forceps is applied in the usual manner to the sides of the head with the pelvic curve toward the face, and the occiput drawn out slowly over the perineum in a horizontal direction until the forehead or root of the nose engages under the symphysis, after which the occiput should be delivered over the anterior margin of the perineum by slowly elevating the handles. Then, by imparting a downward motion to the instrument, the forehead, nose, and chin successively emerge from the vulva.

When interference is indicated in an obliquely posterior variety it is attempted to rotate the head to a transverse or even an anterior variety by means of the hands, and then apply forceps in the usual manner. If, however, this cannot be effected the double application of forceps by Scanzoni's method is resorted to and has given such excellent results that it is employed to the exclusion of all other methods.

In the first application, while the occiput is obliquely posterior, the blades are applied to the sides of the head with the pelvic curve looking toward the face of the child, and downward traction is made until the head impinges on the pelvic floor, when a rotary movement is imparted to the forceps, by which the occiput is slowly brought into a transverse or obliquely anterior position. The forceps, which have become inverted, are taken off, and reapplied in the usual manner for the anterior variety—that is, with the pelvic curve toward the occiput, which is now rotated so as to lie under the symphysis, when the extraction is completed in the usual way.

THE JOHNS HOPKINS HOSPITAL BULLETIN.

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INVESTIGATION INTO SEVERAL CASES OF POISONING BY VAPORS OF "C. P." BENZOL.

By CHARLES GLASER, Baltimore.

A little over a year ago I was asked to inspect a can-factory in this city and discover, if possible, the causes which had led to the poisoning of a number of the employees. All of the victims were young girls, and four of them had been removed to the Johns Hopkins Hospital, where one had died, another had been reported dangerously ill, while the remaining two were found in less alarming states.

The attending physician of the hospital joined me in the inspection of the factory, and at the same time examined 14 girls, aged 14 to 18 years, and employed in the same building from which the four victims, first mentioned, had been removed. A number of the men were also examined. All were found to be highly anemic.

The principal work carried on in the building where these people were employed, consisted in preparing the tops of the cans for sealing. Four machines, each one attended by four girls, carried on this operation. The tops, carried by mechanical means, were passed under a brush, and this, also mechanically, provided each disc near its outer edge, with a rim of rubber dissolved in benzol, and thickened by means of bole and ground asbestos.

Two of the girls were employed at this work, whereas the other two spread the tops, after they had passed out of the machine, on racks to dry. Upon evaporation of the benzol there is left a thin rubber ring near the margin of each top, and this makes possible an hermetic closure.

Although all the windows were open, the air in the building, particularly in the vicinity of the machines, smelled strongly of benzol. Upon inquiry it was stated that about 10 gallons of the rubber solution had been used daily for the preceding six months. During this time several large lots had been consumed without detrimental effects of any kind, and it was not until a certain drum marked No. 36 began to be used, that sickness appeared.

A small sample of benzol from drum No. 36 was tested, with the following results:

Specific gravity at 15½° C. = 0.880.

Sulphuric acid gave a distinct straw-yellow color.

Carbon bisulphide was found present in small quantity by the xanthogenate test.

Anilin and nitrobenzol were shown to be present in traces by Jacquemin's test.

A larger sample of benzol No. 36 was thereupon obtained from the factory, and of this 200 cc. were carefully fractionated with the aid of a Le Bel head.

The initial boiling-point was 80° C. which rose gradually to 85½° C., when 190 cc. had distilled over. The remaining 10 cc. were tested for aniline with negative results, and for nitrobenzol, which gave a strong dark blue coloration by Jacquemin's test.

The first death (that of patient W.) had occurred a few days before I was called in, and this case was out of reach of a chemical examination. The attending physician, however, submitted samples of urine from two of the other patients, C., who was critically ill, and died soon afterward; N., who was not so seriously ill, and who finally recovered.

The examination of these urines was conducted as follows: they were distilled in a current of steam, the distillates were exhausted with ether, and the aqueous residues discarded.

To the ether 5 cc. of $\frac{n}{10}$ sulphuric acid was added, and after shaking, run off. After this the ether was washed several times with small quantities of water. The united acid liquids were then neutralized with solid sodium carbonate. One drop of phenol, and several drops of a sodium hypochlorite solution were added. Case C. gave a strong blue color reaction for aniline.

The ether from which the sulphuric acid had been abstracted was tested for nitrobenzol with negative results in the following manner: it was allowed to evaporate spontaneously until only a little remained; upon the addition of alcohol the liquid was transferred to a flask with a long reflex tube; sulphuric acid and zinc were now added, and the mixture in the flask left in a warm place, usually over night. After neutralization, the aniline formed was extracted with ether, and treated as before described.

Case N. gave a faint blue color reaction for aniline. The ether in this case gave a distinct, but not clean blue color reaction when tested for nitrobenzol. This effect may have been due to a small remnant of aniline, a trace of nitrobenzol, or to the presence in the urine of some other substance capable of giving imperfectly and deceptively a test more or less blurred for aniline after reduction.

The urine of another patient, who had nothing to do with the benzol cases, was submitted by the attending physician, and gave, after steam distillation, and further identical treatment, a negative test for aniline, but a faint brown reaction turning slowly to a faint dirty green when tested for nitrobenzol.

The two cases, N. and C., seem to show an interesting connection between the severity of the cases and the strength of the reactions obtained for aniline.

After the death of patient C. her brain was submitted for analysis. About one-fourth of its was pulped, acidulated, and subjected to distillation in a current of steam. Four hundred cubic centimeters of distillate were obtained.

The distillate was exhausted with ether and the latter examined as before described. Only a trace-reaction for aniline was obtained, and a very faint apparent reaction for nitrobenzol, which could not be positively identified by a control test for isonitril. For this reason the latter reaction was considered as probably due to the same substance that gave a

similarly indistinct reaction in the urine not connected with the benzol cases.

The residue in the still was now made distinctly alkaline by means of sodium hydroxide, and about 250 cc. were distilled over by steam. The distillate was then extracted with ether, and the ether was treated as stated before.

Jacquemin's test gave a very distinct sky blue color.

As the history of these cases is on file at the Johns Hopkins Hospital, I only wish to point out here, that the symptoms of a slow, chronic poisoning by minute quantities of nitrobenzol, are quite different from those of acute cases,[1] so much so, that the attending physicians at the hospital doubted my results, until, in the presence of one of them, I demonstrated aniline in the two urines which had been submitted, and in the brain of the patient who died.

The conclusions to be drawn from these examinations are positive and direct. The cause of the sickness and deaths was the aniline which had been absorbed during long periods in the shape of nitrobenzol and had accumulated in the body until sufficient to cause trouble.

Benzol itself has been at times declared to be perfectly harmless, and at times has been denounced as dangerous.[2]

In some of the cases on record in the literature [3] it is stated that aniline and nitrobenzol were absent. In view of the fact that nitrobenzol was concerned in the cases under discussion, it appears probable, that its presence in minute quantities may have been overlooked for want of sensitiveness in the methods employed.

A rough attempt was made to get at the magnitude of the amounts of nitrobenzol present in benzol by comparing the intensity of the color produced by Jacquemin's test with pure benzol to which known quantities of nitrobenzol had been added. It appeared from these tests that the quantities of nitrobenzol in the fluids analyzed, fluctuated from 1 to 7 mg. per liter. Assuming 5 mg. as the average, 10 gallons or nearly 38 liters per day of the rubber solution used in the factory would contain 190 mg. of nitrobenzol, a quantity, which, for chronic effects, is certainly not negligible. The quantities of aniline present were much smaller, and in the present connection may be neglected.

During the time that the aforementioned analyses were made, samples of various lots of benzol used by the can company during the preceding six months were also examined. The results are tabulated below.

Sample.	Aniline.	Nitrobenzol.	Remarks.
1.	Extremely faint.	None.	Standard by which contract was made.
2.	Extremely faint.	Extremely faint.	59 days later.
Drum No. 36.	None.	Strong dark blue color.	
Drum No. 37.	Faint light blue color.	Distinct light blue color.	
Drum No. 38.	Extremely faint trace.	Strong dark blue color.	
Drum No. 39.	None.	Distinct light blue.	
Drum No. 40.	Very faint trace.	Very faint trace, barely visible blue tint.	

The gap of about 120 days between sample No. 2 and drum No. 36 is regrettable as it is possible that more definite information as to the cause of the presence of the nitrobenzol might have been obtained. The tests, however, show that commercially C. P. benzol, free from nitrobenzol, can be, and at times was, furnished. That nitrobenzol should have appeared in quantities large enough to cause sickness and death, and should then have disappeared again completely, points to some accidental admixture, possibly by the temporary use of some of the drums for storage of nitrobenzol, followed by insufficient cleaning.

Since "C. P." benzol is used largely in the industries, and consequently a considerable number of people are more or less exposed to its vapors, the can company kindly gave me permission to make public the results of my investigation.

[1] Allen, Commercial Organic Analysis, 3d Ed., Vol. 2, Part 2, p. 168.

[2] Wichern: Fabriksfeuerwehr, 1909, Vol. 16, pp. 10-11, 13-14. Benzinevergiftung, München. med. Wchnschr., 1909, Vol. 56, p. 11.

[3] Santesson: Arch. f. Hygiene, Vol. XXI, 1897.

THE VISCOSITY OF THE BLOOD IN HEALTH AND DISEASE.

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The study of the viscosity of the blood, like the investigation of its other physical properties, was first undertaken with the idea of discovering a further aid to clinical diagnosis and to indicate new therapeutic paths. Many methods for measuring the viscosity have been devised, a critical review of which is given in a recent article by Determann.[1]

The work here reported will be dealt with under two captions:

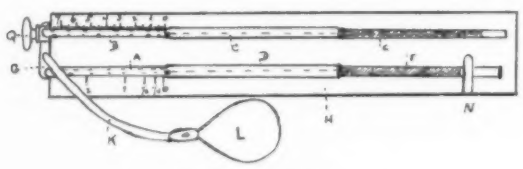
I. The viscosity of the blood in normal individuals, including a consideration of the factors concerned in the production of the viscosity.

II. The viscosity of the blood in disease, a collection of numerous clinical observations in various diseases with an explanation, where possible, of the changes which occur.

In all the determinations made, the Hess [2] Viscosimeter was used. The instrument is not well known in this country so a description of it may not be amiss.

On an opaque glass base, H (see drawing), two graduated glass tubes, A and B, are fastened which are connected at one end by a third tube, G, and this in turn is in communication through a branch with the rubber balloon, L. At the other end, the two tubes, C and D, are drawn to capillaries of very

fine caliber which widen again to the bore of A and B. The tube, F, placed on H and held there by the support N, is removable, and can be replaced by any of a number of similar ones. By means of the stop-cock Q, it is possible to establish or to interrupt the communication between B and G, and so between B and the balloon L. The tubes A and B are bent to a right angle at their junction with G. Interposed between the rubber tube K, and the balloon L, is a glass tube which communicates by an opening with the air.



HESS VISCOSIMETER.

The entire apparatus is contained in a case 29 x 9 x 6 cm., having compartments for tubes similar to F, for a flask of ammonia, to be used in cleaning the instrument, and a thermometer mounted on H.

The method of making determinations is as follows: In the tube B-C-E is a column of distilled water, the left meniscus of which is at 0 (zero). A tube F is filled by capillary action with blood. It is then placed in position end to end with D, and by means of suction exerted by L the blood column is drawn up to 0 (zero). The cock Q is then opened and under the suction of the bulb, the water and blood flow through the tubes A and B.

As soon as the blood reaches 1 (on the scale) suction is discontinued and the readings are made. The mass of water which has risen in B, as shown on the scale, gives the relation of the viscosity of the blood in question to that of distilled water.

Water and blood are now expelled by pressure on the bulb L, the cock Q being closed when the water reaches 0 (zero). F is removed, and the tube DA is cleaned with ammonia twice drawn into it.

If the blood is very viscid or coagulates rapidly, it may be drawn to one-half or one-fourth, and the values obtained multiplied by 2 or 4, respectively.

Controls made with fluids of known viscosity show an accuracy within 1-2 per cent.

Experiments by Hess showed, that with every rise in temperature of 1° C., the viscosity decreases 0.8 per cent. Observations at ordinary room temperatures show an error of about 4 per cent which, in relation to other errors which may arise due to the personal equation, is negligible. A correction is necessary, then, only when there are great variations in the temperature.

The blood for our experiments was obtained from a needle stab in the ear lobule, previously cleaned with alcohol. In those cases in which determinations on the plasma were made, the blood was drawn from the median basilic vein by venepuncture, and coagulation was retarded by the addition of dry hirudin * as recommended by Determann.[3]

In making the determinations, an absolutely fixed temperature was not maintained, the suction force varied, and errors probably arose in drawing the blood. These factors, however, were present in all the experiments, could not be excluded, and therefore do not vitiate the results.

I. THE VISCOSITY OF THE BLOOD IN NORMAL INDIVIDUALS.

The normal viscosity is difficult to determine; first, because it is not always easy to decide just who is normal; and second, because of marked physiological variations in the viscosity of the blood. That various observers do not agree as to the normal, is shown by the table here given:

			Man.	Woman.
Hess [4]	4.57	Determann [8]	4.798	4.516
Bence [5]	5.4	Kottmann [9]	5.11	
Rotky [6]	5.12	Robert-Tissot [10]	4.79	4.51
Hirsch & Beck [7]	5.1			

We chose for these observations students varying in age from 21 to 28 years—robust young men. The readings showed:

5.0	4.8	4.5	4.4	4.5
4.6	4.6	4.7	4.3	4.5
4.4	4.4	4.4	4.6	4.4
4.7	4.5	4.6	4.5	46
4.5	4.4	4.6	4.7	4.5

The average in these cases gives 4.55 as the viscosity for adult men between the ages of 20 and 30 years.

Similar determinations made on healthy women, in the same decade of life, showed:

4.5	5.0	4.6	4.3	4.5
4.7	4.5	4.3	4.5	4.3
4.9	4.3	4.8	4.6	4.4
4.6	4.5	4.5	4.4	4.2
4.8	4.3	4.3	4.7	4.3

Thus the normal for women—4.51—is very little different from that in men.

Hess [4] and others have shown that the viscosity of the blood varies with age. Low values as 3.89 (male) and 3.80 (female) present in the first decade, are supplanted by rising values as life advances.

Variations with the time of day, digestion, rest in bed, muscular activity, body weight, body temperature, menstruation, pregnancy, etc., have been previously noted.

The relative importance of the other physical and chemical properties of the blood in determining its viscosity, is much mooted. Viscosity does not vary directly with the specific gravity—"low viscosity values occur with high specific gravity

* Hirudin is a scaly solid, soluble in water, obtained from an extract of the buccal glands of the leech—Hirudo medicinalis. It has the power of retarding coagulation of the blood even when used in minute quantities, and has no influence on viscosity.

and conversely, due probably to the fact that, whereas all the elements of the blood enter into the production of the specific gravity, only some of them influence the viscosity" (Adam [11]). For the blood is not iso-viscous, the more viscid substances bound in the erythrocytes losing some of their potency.

That hæmoglobin and viscosity do not always vary in direct proportion is shown below:

Hæmoglobin.	Viscosity.	Hæmoglobin.	Viscosity.
50	3.2	30	3.0
79	4.5	100	5.0
58	4.5	60	3.8
95	4.5	42	2.6
80	4.3	75	4.2
95	4.0	73	3.4

As to the constancy of the relation between the number of the red corpuscles and the viscosity of the blood, no little discussion has arisen. Determann (*l. c.*[8]) notes that "though a fairly close parallel exists between the two, so many exceptions are found, that on the determination of the red-cell count no safe inference as to the viscosity can be drawn." Burton-Opitz,[12] on the other hand, maintains that "the red corpuscles are the principal factor in determining the viscosity of the blood."

In our earlier observations, it seemed that a direct relation between these two factors could be demonstrated. So close indeed did this relation seem, that we felt able to estimate the red-cell count from the readings obtained on the viscosimeter. Subsequent series of observations, however, have shown that though the viscosity of the blood and the number of the erythrocytes frequently do vary in direct proportion, in many instances no close parallelism can be proved.

R. B. C.	Viscosity.	R. B. C.	Viscosity.
4840000	2.9	3120000	3.1
3650000	3.6	4000000	4.3
3900000	3.2	2080000	2.6
4130000	2.6	2100000	2.0
4480000	4.4	4220000	4.1
2200000	2.6	4900000	4.1
4320000	4.4	3700000	4.0
4000000	4.3	3900000	4.0
4100000	3.9	4000000	5.0
3700000	3.9	4000000	4.3
4300000	4.6	3800000	4.2
4700000	4.6	4400000	4.2
5600000	4.7	2760000	3.0
6400000	5.5	3300000	3.0
4200000	4.7	5120000	5.1
5800000	4.9	4700000	5.0
6800000	5.2	5000000	4.5
4200000	4.2	4320000	4.6
3200000	3.4	2975000	3.1
3850000	4.6	4100000	3.3

In order to estimate, if possible, of just how much importance the red corpuscles are in determining the viscosity of the blood, the following experiments were performed:

Twenty cubic centimeters of blood were drawn under aseptic conditions from the median basilic vein, into a syringe containing 2 mgm. of dry hirudin and the viscosity of the whole blood determined. A part of this blood was centrifugalized until sedimentation of the formed elements was complete. The supernatant plasma was pipetted off and the viscosity of it measured. The corpuscles were then washed with physiological saline solution, and suspensions made, until the cell count was the same as that of the blood used. The viscosity of this suspension was then determined, and making allowance for that of the saline solution, we had the coefficient for the red corpuscles.

Blood.	Plasma.	R. B. C.	Saline.
5.2	1.9	2.4	1
4.6	1.7	2.2	..
4.5	1.8	2.0	..
4.7	2.0	2.3	..
4.3	1.8	1.9	..
5.0	1.7	2.2	..
4.9	1.9	2.4	..
4.4	1.9	1.9	..
5.1	2.0	2.6	..

From these findings it seems evident that though the number of red cells in the blood is an important factor, it cannot be the dominant element in determining the viscosity of the blood. The significance of the plasma is also well shown, and variation in its composition must be of no little moment in causing fluctuations in the coefficient for the whole blood.

The influence of hæmoglobin on the viscosity has been demonstrated by Adam (*l. c.*). This author noted that in centrifugating blood, whenever slight hæmolysis occurred, the coefficient of the tinted plasma was higher than when a clear plasma was obtained. In order to prove whether the increased viscosity was due to hæmoglobin, he dissolved crystals of horse hæmoglobin in human plasma and found rising values with increasing concentrations. He then laked blood by alternately freezing and warming it, and found on centrifugation two layers—the upper, a colloidal fluid free of corpuscles with a coefficient higher than that of the whole blood; the lower layer was so thick with the stroma of the cells that its viscosity was extremely great. The increased viscosity of the laked blood is probably due largely to the increased protein content of the plasma, consisting mainly of hæmoglobin. That this last is true, he showed by demonstrating that, whereas carbon dioxide passed into normal plasma had no effect on its coefficient, when it was passed into the plasma of hæmolyzed blood a rise in viscosity occurred.

The observations on the plasma of whole and of laked blood we have been able to confirm in a series of ten cases.

Case.	Normal blood.	Laked blood.	Normal plasma.	Laked blood plasma.
I	4.9	5.7	1.9	5.1
II	4.5	5.2	1.8	4.7
III	4.0	5.9	1.9	4.3
IV	4.6	5.2	1.7	4.8
V	5.0	5.9	2.0	5.1
VI	4.3	5.0	1.8	4.4
VII	4.4	5.1	1.7	4.6
VIII	4.6	5.3	2.0	4.7
IX	4.7	5.4	1.8	4.8
X	4.5	5.6	1.9	4.8

This relation between whole and laked blood had previously been pointed out by Determann (*l. c.*[8]), who explained the higher readings in the hæmolyzed blood as due to the libera-

tion of highly viscid substances, normally contained within the stroma of the erythrocytes, and thus prevented from influencing the viscosity of the whole blood. He found clinical evidence to support this view in observations on a case of black water fever with hæmoglobinæmia, in which, while the patient was well, the laked and the whole blood differed greatly in viscosity, whereas during an attack of hæmoglobinuria the difference was less marked. In this instance, too, he had an indication that the viscosity of the blood is to some extent at least dependent on the osmotic tension between the plasma and the red corpuscles, and the difference between the coefficients of whole and of laked blood may perhaps be an expression of the resistance or fragility of the red corpuscles in health and in disease.

A priori, the proteid content of the blood would be an important element in the production of the viscosity of the blood, and support is given this hypothesis by the experiments of Burton-Opitz [18] on animals and by the observations of Determann (*l. c.*[5]) on man.

The former noted that the blood of dogs fed on meat has a higher viscosity than that of dogs, hungry, or on a low proteid diet. He also found that food rich in fat raises the coefficient of the serum especially, whereas proteid food raises that of the whole blood.

Determann (*l. c.*[5]), studying the viscosity in vegetarians and in meat eaters, found that the coefficient in the former was low compared to that of the latter—4.32 : 4.85, though the hæmoglobin, specific gravity, and the number of the formed elements of the blood were not different. If these findings stand the test of further observations, they may furnish a valuable clue to dietetic regulation in those diseases in which it seems advisable to reduce the viscosity of the blood. The metabolic experiments of Bence (*l. c.*), however, showed no changes in the viscosity of the blood after the use of diets over short periods of time. Similarly, in 35 cases of cardiac disease in the Johns Hopkins Hospital, the feeding of a modified Oertel diet, over periods of from two to six weeks caused no appreciable alteration in the viscosity coefficients.

The influence of various salts has also been studied by Adam (*l. c.*). In a series of careful experiments, this author found that the viscosity of a solution rises with the increase of its proteid content and in general with the salt concentration. "But all salts do not influence viscosity to the same degree, the multivalent salts having a greater influence than the univalent. Among the latter, the iodides and potassium bromide are unique, in that they decrease the viscosity." This last observation lends support to the work of Müller and Inada [14] that iodides, given therapeutically, diminish the viscosity of the blood, but Adam asserts "that ordinary doses of the iodides rarely have a viscosity-lowering action, and at times even a viscosity-raising effect may be noted."

That the gaseous content of the blood is important in its effect on viscosity, has long been recognized. Koryani and Bence [19] found maximal values when saturation of the blood with carbon dioxide was reached, and that as this gas was replaced by oxygen, the viscosity decreased to a minimum beyond which the further addition of oxygen caused it to rise again. The work of Hamburger [16] and of Limbeck [17] indicated that as the carbonic acid content of the blood increases, the red corpuscles take up water and anions from the plasma, whereby the volume of each cell becomes greater, while the proteid, fat and sugar content, the mass of dry residue, specific gravity and osmotic pressure of the plasma rise, to fall again when the carbon dioxide is driven out.

Burton-Opitz [18] demonstrated similar changes by having dogs breathe alternately normal air and air surcharged with carbon dioxide, and Rotky (*l. c.*) noted a decrease in the viscosity of the blood when a patient with emphysema and cyanosis was given oxygen inhalations.

The viscosity-raising action of carbon dioxide we have demonstrated by rebreathing experiments.

A rubber mask, such as is used in giving gas anæsthesia, was closely fitted over the nose and mouth of a patient, and he was made to breathe over and over again the air contained in a four-liter rubber balloon. Rebreathing was continued until tachypnœa and cyanosis were pronounced, when the mask was removed. The viscosity of the blood determined just before, during and 30 minutes after the experiments are here tabulated:

Before rebreathing.	During rebreathing.	After thirty minutes.
4.5	4.8	4.6
3.7	4.4	3.9
4.2	4.6	4.2
4.6	4.9	4.7
3.9	4.3	4.0
4.0	4.5	4.2
4.3	4.6	4.3
4.5	4.6	4.5
4.8	5.0	4.8

In every instance the viscosity of the blood was increased during the experiments, to decrease again when normal air had been breathed for 30 minutes.

Conclusions.

1. The viscosity of the blood is a variable factor, determined to some extent by the variations in the constituent elements of that fluid.

2. It is slightly greater in men than in women.

3. The viscosity of the blood depends on the number of the red corpuscles, the hæmoglobin content, the gaseous richness; and to a lesser degree, on the proteid, fat and salt composition of the blood. With no one of these factors does viscosity vary in direct proportion.

4. The viscosity of the plasma is normally 1.7-2.0, average 1.86.

5. The viscosity of the blood is not influenced by diets used over short periods of time.

II. The Viscosity of the Blood in Disease.

When the influence on the viscosity of the blood, which the factors just cited exercise is recalled, it would seem probable that in those diseases in which the blood is most affected the maximal alterations in the viscosity would be found. It would seem likely for instance, that the readings would be low in

anæmia, high in polycythæmia; low in hydræmia, high in conditions with marked salt retention, and so on. To what extent this *a priori* reasoning is valid, the following observations show.

A. SECONDARY ANÆMIA.

Under this heading are collected anæmias of different degrees of severity occurring in diverse functional and organic diseases.

Disease.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity.
Ascaris lumbricoides	3,300,000	9,900	68%	3.2
Carcinoma of sigmoid	2,840,000	8,300	30	2.8
Carcinoma of rectum	2,530,000	13,000	28	2.4
Aortic aneurism	3,496,000	8,800	40	3.6
Aortic aneurism	3,620,000	9,500	44	3.7
Dementia paralytica	4,220,000	5,900	50	4.1
Tabes dorsalis	4,500,000	7,100	56	4.2
Malaria	3,700,000	5,100	40	3.5
Tuberculous peritonitis	2,600,000	10,600	30	2.4
Brain tumor	3,540,000	7,900	36	3.1
Myocarditis	2,320,000	7,160	56	1.8
Hysteria	3,900,000	6,800	60	3.2
Chronic nephritis	4,130,000	19,480	92	2.6
Chronic nephritis	4,480,000	6,000	76	4.4
Tuberculosis	2,200,000	4,600	62	3.6
Typhoid fever	4,320,000	6,100	70	4.4
Spastic paraplegia	3,648,000	9,000	51	3.6
Typhoid fever, convalescence	4,272,000	8,100	76	4.2
Malaria	3,120,000	5,600	63	3.1
Syphilis tertiary	4,000,000	6,000	70	4.3
Carcinoma of stomach	2,700,000	11,000	50	2.9
Tuberculous meningitis	3,920,000	12,100	52	3.8
Typhoid fever	4,300,000	7,200	67	4.3
Typhoid fever	4,000,000	6,600	63	3.9
Dementia præcox	4,300,000	5,800	80	4.2
Hæmorrhoids	2,160,000	9,900	40	2.0
Neurasthenia	4,100,000	7,500	80	3.9
Psychasthenia	3,900,000	6,380	61	3.7
Gastric neurosis	4,320,000	8,100	73	4.2
Amœbic dysentery	4,200,000	9,600	67	4.2
Carcinoma of stomach	2,080,000	12,200	47	2.6
Myocarditis	3,610,000	11,400	44	3.7
Diabetes mellitus	3,600,000	7,600	64	3.6
Cirrhosis of liver	4,208,000	8,000	90	4.4
Cirrhosis of liver	3,870,000	9,200	81	3.7
Delirium tremens	4,180,000	10,100	70	4.1

From this tabulation it is evident that the viscosity of the blood is diminished in anæmic individuals, and that the diminution is roughly proportional to the severity of the anæmia.

Of no little interest is the gradual return of the viscosity towards normal with the onset of convalescence, a fact previously noted by Determann (*l. c.*) and beautifully shown in these two cases.

CASE I.

Date.	R. B. C.	Hæmoglobin.	Viscosity.
November 4	3,496,000	40%	3.6
November 11	3,620,000	44	3.7
November 18	3,900,000	39	4.0
November 25	4,220,000	50	4.0
December 2	4,520,000	59	4.4
December 9	4,900,000	81	4.5

CASE II.

Date.	R. B. C.	Hæmoglobin.	Viscosity
March 1	2,200,000	30%	2.5
March 8	2,300,000	30	2.5
March 15	2,500,000	32	2.7
March 22	3,000,000	38	3.1
March 29	3,450,000	40	3.3
April 6	4,100,000	51	3.7
April 13	4,000,000	60	3.8
April 20	4,650,000	78	4.3

B. PRIMARY ANÆMIA AND LEUKÆMIA.

I. Primary Pernicious Anæmia.

Case.	R. B. C.	Hæmoglobin.	W. B. C.	Viscosity. Blood.	Plasma.
1	1,950,000	40%	7300	2.0	1.5
2	780,000	43	8000	1.9	1.1
3	1,072,000	50	9200	2.3	1.3
4	2,225,000	61	6300	2.5	1.4
5	1,220,000	50	8700	1.7	1.2

II. Leukæmia.

Case.	Type.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Plasma
1	Myelogenous	3,000,000	339,000	60%	6.2	2.4
2	"	2,800,000	76,000	58	3.9	1.8
3	"	3,600,000	40,000	65	4.7	2.0
4	Lymphatic	2,320,000	46,400	56	3.6	1.9

Table I shows that in primary pernicious anæmia, as in secondary anæmias, the viscosity of the blood is low, and here, too, the coefficient of the plasma is subnormal.

Table II, on the contrary, shows that in leukæmia, though the viscosity of the blood may be decreased, due probably to the marked anæmia, the readings are not as low as would be expected, and in some cases hyperviscosity may be noted. Rotky (*l. c.*) found similar changes and also noted an increased viscosity of the plasma. He finds an explanation for the relative and absolute high values in leukæmia in the marked leucocythæmia.

C. POLYCYTHÆMIA.

If conclusions can be drawn from the observations on the influence of erythrocytic and hæmoglobin richness of the blood on viscosity, these cases should show high coefficients, and in the four cases examined this was true.

Disease.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Plasma.	
Mediastinal tumor	8,120,000	6,900	119%	13.6	2.9	Cyanosis.
Obesity	7,620,000	5,300	105	8.3	2.2	No cyanosis.
Osler-Vaquez disease	6,049,000	7,300	102	6.2	2.4	Cyanosis.
Emphysema	6,320,000	9,400	104	6.1	2.3	Cyanosis.

In all four the viscosity of the plasma was also increased, confirming the observation of Kottmann (*l. c.*).

D. NEPHRITIS.

Diagnosis.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Plasma.	Blood pressure.
Chr. nephritis	3,240,000	7,560	65%	3.2	2.1	220
Acute "	5,048,000	15,400	85	3.9	2.3	108
Chr. "	5,800,000	6,000	100	5.6	2.1	180
" "	4,300,000	6,200	80	3.9	2.0	180
Acute "	5,000,000	15,800	90	4.0	2.2	195
" "	5,120,000	11,400	99	4.3	2.4	173
Chr. "	3,640,000	9,300	60	3.8	2.1	140
" "	3,230,000	7,400	75	3.6	2.0	210
" "	2,000,000	5,900	63	3.2	2.1	192
" "	3,720,000	9,300	60	3.9	2.3	155
" "	3,500,000	7,000	59	3.8	2.0	198
" "	4,120,000	5,900	76	4.2	1.9	144
" "	4,700,000	8,300	81	4.3	2.1	150
" "	4,340,000	8,600	80	4.1	2.4	194
" "	4,600,000	7,300	79	4.4	2.0	187
" "	3,980,000	6,900	66	3.9	1.8	162
" "	3,820,000	7,900	69	4.0	2.0	155
Acute "	4,650,000	5,300	70	4.5	2.2	185
Chr. "	3,920,000	6,200	72	4.0	1.9	173
" "	5,000,000	7,100	90	5.1	2.3	148
" "	3,000,000	9,000	72	2.8	1.9	110
" "	3,120,000	5,400	55	3.2	1.7	151
" "	4,200,000	7,300	73	4.1	2.0	186
" "	4,750,000	6,500	77	4.3	2.1	192
" "	3,910,000	6,900	68	3.6	1.9	174
" "	3,300,000	7,800	62	3.7	1.7	139

In 22 of the cases the viscosity of the blood was subnormal, in two about normal, and in only two above normal. In 13, there was hypervicosity of the plasma, a normal coefficient in 13, and hypoviscosity in none. These statistics are in complete agreement with those of Rotky (*l. c.*)

The low viscosity of the blood probably finds its chief explanation in the anæmia present, while in a few instances it is not unlikely the result of hydræmia. As a further factor in bringing about hypoviscosity, Bachmann [19] considers globulin. He says "crystallizable bodies have a lower viscosity than non-crystallizable ones. Globulin belongs to the first group, and since in nephritis a relative globulin increase occurs, this condition may contribute to a reduction of viscosity." As to the cause of the hyperviscosity of the plasma, we may speculate on the presence of retained products of metabolism, perhaps protein, perhaps salt, their effects on the viscosity of the whole blood veiled by the greater influence of the formed elements, hæmoglobin, etc., but made clear when these are removed by centrifugation.

Interesting in connection with renal disease is the relation of the viscosity to blood pressure. In 18 of the cases there was hypertension (155-220 mm. Hg.), in two there was hypotension, and in six the tension was about normal. The study of the protocol of the cases shows that no constant relation exists—with hypertension there may be hypoviscosity or hyperviscosity and *vice versa*. Many of the patients with increased pressure, however, showed lowered viscosity of the blood, due perhaps, as Bachmann has suggested, to the indirect influence of hydræmia—"hydræmia leads to increased heart action and correspondingly to high pressure in order that, in spite of the thinning of the blood, the tissues may still be properly nourished."

E. CARDIAC DISEASE.

I. With Œdema.

Disease.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Viscosity. Plasma.	Remarks.
Myocarditis.	2,840,000	8,000	40%	2.9	1.3	Anasarca; no cyanosis.
Aortic and mitral insufficiency....	3,960,000	6,000	51	3.8	1.5	Œdema of legs; no cyanosis.
Mitral insufficiency.....	3,520,000	6,600	53	3.9	1.7	Ascites; œdema; no cyanosis.
Myocarditis.	4,200,000	7,800	69	4.4	1.8	Œdema of legs; no cyanosis.
Aortic and mitral insufficiency....	4,800,000	10,400	63	4.4	1.2	Hydrothorax; œdema of legs; no cyanosis.
Aortic insufficiency.....	3,120,000	8,900	48	3.6	1.3	Anasarca; hydrothorax.
Mitral insufficiency; myocarditis.	3,680,000	12,300	52	3.9	1.5	Anasarca; no cyanosis.
Mitral stenosis and insufficiency....	4,530,000	14,100	67	4.3	1.4	Moderate cyanosis.
Mitral insufficiency.....	4,670,000	9,600	69	4.9	1.6	Marked cyanosis.
Myocarditis.....	3,700,000	8,900	55	4.0	1.7	Œdema of legs; no cyanosis.

Hypoviscosity occurs in this series almost without exception. The low values are doubtless due in part to the anæmia, in part to the hydræmia. The latter probably stands in a causal relation to the diminished viscosity of the plasma.

II. Without Œdema.

Disease.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity.	Blood pressure.	Remarks.
Mitral insufficiency.....	4,792,000	9,800	82%	4.7	150	No cyanosis.
Aortic insufficiency.....	3,496,000	11,000	45	3.9	195	No cyanosis.
Mitral and aortic insufficiency ...	4,220,000	7,500	60	4.5	168	No cyanosis.
Myocarditis.....	4,520,000	10,200	58	4.7	180	Slight cyanosis.
Myocarditis.....	3,984,000	8,600	71	4.0	189	No cyanosis.
Mitral stenosis and insufficiency....	5,280,000	12,000	92	5.0	140	Marked cyanosis.
Mitral insufficiency.....	5,000,000	7,400	90	5.0	170	Marked cyanosis.
Myocarditis.....	3,620,000	6,600	53	4.2	210	No cyanosis.
Mitral stenosis and insufficiency....	5,400,000	9,500	93	5.2	185	Marked cyanosis.
Mitral insufficiency.	5,200,000	14,000	91	5.1	190	Marked cyanosis.

In this group no constant alteration in the viscosity values are found. The low readings correspond in the main with the anæmia, the high readings with the polycythæmia and the cyanosis. The blood-pressure viscosity ratio, as in nephritis, is inconstant, though occasional instances of association of low viscosity with high tension does suggest a compensatory mechanism.

F. DIABETES MELLITUS.

No.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Viscosity. Plasma.	Remarks.
1	4,930,000	7,200	91%	5.2	2.2	Young man, obese.
2	5,300,000	9,400	98	5.4	2.3	Young man, thin; acidosis.
3	5,640,000	6,900	100	5.9	2.3	Obese woman; acidosis.
4	4,520,000	8,600	89	4.3	1.7	Thin woman, young.
5	4,700,000	9,800	86	4.2	1.9	Obese woman, aet. 60.
6	5,000,000	7,700	92	4.8	1.8	Obese woman, aet. 42.

Three of the cases show increased viscosity of the blood and of the plasma—one shows high normal values, and in the remaining two, low readings for the blood, and normal ones for the plasma were obtained.

The increased viscosity of the blood is here probably due to the relative polycythæmia, the result of concentration of the blood due to the polyuria. As to the factors concerned in the production of hyperviscosity of the plasma, concentration, lipæmia, and hyperglycæmia all probably play a rôle. That lipæmia would raise the viscosity of the plasma is to be expected from the observation of Burton-Opitz (*l. c.*[18]) that "in dogs, food rich in fat raises the viscosity of the serum especially." The same observer found "inconsiderable" rises in viscosity in dogs with artificially produced hyperglycæmia.

G. JAUNDICE.

Diagnosis.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Viscosity. Plasma.
Cholelithiasis	5,100,000	14,300	94%	5.2	2.1
Cholelithiasis	4,900,000	19,200	90	5.0	2.0
Cholelithiasis	4,820,000	10,200	90	4.8	1.9
Carcinoma of bile ducts.	3,700,000	26,000	73	4.6	2.0
Carcinoma of pancreas..	2,920,000	9,400	58	5.3	2.4
Catarrhal jaundice	5,000,000	8,900	96	5.1	2.2
Catarrhal jaundice	4,780,000	14,000	86	4.9	2.0
Acute hepatitis	4,200,000	18,000	80	4.7	1.8
Luetic hepatitis	4,600,000	7,000	82	5.0	1.9

The high coefficient here is probably due to the cholæmia which was present in all of the cases.

II. ACUTE INFECTIOUS DISEASES.

I. Typhoid Fever.

The unusually large typhoid fever service in the Johns Hopkins Hospital furnished a long series of these cases in which any characteristic changes in the viscosity of the blood could be studied. The influence of restricted diet, of febrile reaction and of cold sponges and tubs could also be noted.

No.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity Blood.	Hb / V	Viscosity after sponge.	Remarks.
1	4,690,000	4,300	80%	4.8	16.6	5.0	1st week.
2	4,272,000	3,750	76	4.2	18.0	4.4	1st week.
3	4,120,000	5,100	70	4.0	17.5	4.2	2d week.
4	4,310,000	6,200	74	4.4	16.8	4.5	2d week.
5	4,000,000	3,600	69	3.9	17.7	3.9	2d week.
6	4,868,000	7,000	83	4.5	16.2	4.6	2d week.
7	4,236,000	4,600	80	4.1	19.5	4.2	3d week; furunculosis.
8	4,100,000	8,000	75	3.9	18.9	4.1	4th week; phlebitis-relapse
9	4,300,000	6,680	67	4.2	15.9	4.5	3d week
10	3,960,000	7,600	63	3.9	16.1	4.1	3d week; hemorrhage.
11	5,000,000	8,200	89	4.9	18.1	5.0 Tub 80°	1st week; psychosis.
12	4,860,000	4,300	84	4.7	17.8	5.0	2d week.
13	4,730,000	3,980	84	4.7	17.8	4.8	2d week.
14	4,120,000	4,600	82	4.0	20.5	4.4	2d week; bronchitis.
15	3,980,000	3,700	76	4.2	18.0	4.3	1st week; bronchitis.
16	4,980,000	5,100	91	5.0	18.2	5.0	2d week.
17	4,530,000	5,420	88	4.5	19.5	4.9	2d week; phimosis.
18	4,420,000	6,200	83	4.3	19.3	4.5	2d week.
19	4,500,000	6,700	81	4.5	18.0	4.7	2d week.
20	4,720,000	6,300	86	4.8	17.9	4.9	2d week.
21	4,930,000	3,570	89	5.0	17.8		3d week.
22	4,460,000	4,680	80	4.5	17.7		3d week.
23	4,570,000	4,000	83	4.3	19.3		3d week.
24	5,080,000	6,600	95	5.0	19.0		1st week.
25	4,000,000	7,400	78	4.0	19.7		2d week.
26	4,800,000	9,000	86	4.6	18.7		3d week.
27	4,880,000	8,300	90	4.9	18.4		3d week.
28	4,240,000	6,700	82	4.1	20.0		3d week.
29	4,590,000	5,900	86	4.2	20.4		3d week.
30	4,780,000	7,100	83	4.5	18.4		3d week; cholecystitis.
31	4,630,000	8,500	85	4.5	18.8		3d week.
32	4,690,000	11,100	83	4.0	20.7		3d week.
33	4,760,000	10,300	81	4.1	19.7		3d week.
34	4,511,000	9,700	79	3.9	20.2		4th week.
35	4,316,000	8,800	79	4.0	19.7		4th week.
36	4,920,000	6,900	84	4.4	19.0		4th week.
37	4,130,000	7,600	80	4.0	20.0		4th week; relapse.
38	3,895,000	8,040	76	4.0	19.0		4th week; hemorrhage 12th day.
39	5,400,000	3,750	92	4.2	21.9		4th week; well.
40	4,540,000	6,000	80	4.2	19.0		4th week; well.
41	4,290,000	5,700	77	3.8	20.2		4th week; well.
42	4,730,000	10,000	87	4.3	20.2		4th week; well.
43	3,960,000	4,600	74	3.8	19.5		4th week; epistaxis.
44	3,820,000	4,900	76	3.8	20.0		4th week; emaciated.
45	5,000,000	6,800	93	4.6	20.2		4th week; well.
46	5,130,000	3,200	93	5.0	18.6		6th week; well.
47	4,660,000	4,980	88	4.8	18.3		6th week; well.
48	4,620,000	6,600	87	4.5	19.3		5th week; well.
49	3,980,000	7,300	84	4.0	21.0		8th week; well; perforation.
50	4,320,000	4,160	74	4.3	17.2		7th week; cholecystitis; well.

From these data the following conclusions may be drawn:

1. Typhoid fever produces no characteristic change in the viscosity of the blood.

2. The lowered values noted during the course of the disease with later gradual restitution to normal as convalescence progresses, is parallel to the development of anæmia and the subsequent regeneration of the blood.

3. The hæmoglobin—viscosity quotient $\left(\frac{Hb}{V}\right.$, which Bachmann (*l. c.*) has shown to be increased in this disease, varies considerably, and in the majority of instances is subnormal, in one patient being as low as 16.0 (normal=20). This author had found a high quotient in 10 out of the series of 11 cases, and having noted a subnormal quotient in pneumonia, stated that—"these few observations show that a differential diagnosis between these diseases can readily be made by a comparison of their quotients." In this we do not concur.

4. Cold sponges or tubs, whether followed by a good reaction or by cold and shivering, cause an elevation of viscosity. This is in agreement with the observations of Determann (*l. c.*).

5. The restricted diets—consisting of milk, albumen and mush—apparently have no marked effect on the viscosity of the blood.

6. The leucopenia is apparently of no importance in this connection.

II. Pneumonia.

In pneumonia the occurrence of marked salt retention and of cyanosis would, other things being equal, lead to increased viscosity of the blood. Leucocytosis is rarely so marked as to enter into consideration as a factor.

Remarks.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity.	Hb/V
Crisis. Rt. lung	4,240,000	19,240	71%	4.3	16.5
Crisis. Rt. lower lobe	4,900,000	26,000	78	4.6	16.9
Rt. lung. Empyema	5,220,000	42,000	96	5.5	17.4
Lt. lung. Empyema	5,010,000	32,000	93	5.1	18.2
Rt. lung and Lt. lower lobe	5,100,000	20,000	90	5.2	17.2
Both upper lobes	4,600,000	16,400	80	4.9	16.3
Lysis. Rt. lower lobe	4,720,000	12,300	78	4.8	16.3
Crisis. Rt. lower lobe	4,490,000	14,300	72	4.6	15.6
Crisis. Rt. upper lobe	4,700,000	10,200	76	4.9	15.9
Both lower lobes	5,000,000	19,300	84	5.2	15.4
Rt. upper lobe pleural effusion	5,600,000	22,200	96	5.9	16.3
Rt. lower and middle and Lt. lower lobes.	3,900,000	11,600	65	4.7	17.8
Lysis. Rt. lower lobe	5,430,000	13,400	94	6.0	15.6
Both lower and Rt. upper lobes	3,800,000	18,300	67	3.9	16.0
Lysis. Rt. upper lobe	4,750,000	28,000	75	4.9	15.3
Crisis. Lt. lower lobe	4,240,000	21,000	72	4.0	18.0
Crisis. Rt. lower lobe	4,160,000	16,000	72	4.3	16.7
Lysis. Rt. lower lobe	3,920,000	14,600	66	4.0	16.5
Crisis. Rt. lung	4,804,000	17,100	82	5.0	16.4
Crisis. Rt. lower lobe	4,920,000	12,000	88	4.7	18.6

Thirteen of the cases showed increased viscosity of the blood and in all the hæmoglobin-viscosity quotient was diminished. The latter finding is more constant than in typhoid fever, but from it no safe inference can be drawn.

III. Malarial Fever.

No.	R. B. C.	W. B. C.	Hæmoglobin.	Viscosity. Blood.	Viscosity. Plasma.
1	3,800,000	5500	65%	3.9	2.1
2	4,300,000	6400	80	4.4	1.9
3	4,700,000	5900	82	4.9	2.4
4	4,100,000	7900	74	4.2	2.2
5	3,300,000	8100	68	5.0	2.0
6	4,520,000	6800	72	4.3	1.8
7	4,600,000	5200	76	4.5	1.9
8	4,200,000	4900	70	5.2	2.0
9	4,900,000	5900	85	4.5	2.0
10	4,700,000	7300	81	4.6	1.9

Here there is either normal or subnormal viscosity of the blood, and normal or hypernormal viscosity of the plasma. The lowered readings for the blood where present, are probably due to the anæmia, and the high readings in three of the cases may find an explanation in the increased volume of the infected erythrocytes. The high viscosity of the plasma may be the result of hæmoglobinæmia present in these cases.

CONCLUSIONS.

The viscosity of the blood and of the plasma is reduced in anæmias, either primary or secondary. With regeneration of the blood, normal values are restored. In leukæmia there is hypoviscosity of the blood with hyperviscosity of the plasma. Leucocythæmia may explain the hyperviscosity of the blood, which is found in a few cases.

The viscosity of the blood and of the plasma is increased in polycythæmia.

Hypoviscosity of the blood and hyperviscosity of the plasma is almost constant in cases of nephritis; the former due to the anæmia, the latter to retained products of metabolism. Though in many instances hypoviscosity occurs in cases with hypertension, this interrelation is often absent.

In cardiac disease without œdema, no constant change is the viscosity is to be found, the coefficient apparently varying with the anæmia and the carbon dioxide content of the blood. In cases with hydræmia, there is hypoviscosity of the plasma.

In diabetes mellitus, the viscosity of the blood and of the plasma is increased, in many cases probably the result of concentration of the blood due to polyuria, of hyperglycæmia and of lipæmia.

In icterus there is generally increased viscosity of the blood and in the plasma, probably the result of cholæmia.

In typhoid fever the viscosity varies with anæmia, is increased by hydrotherapy, and apparently is uninfluenced by diet. The $\left(\frac{Hb}{V}\right)$ quotient is more often decreased than increased.

In pneumonia the viscosity is generally above normal due to cyanosis and salt retention. Here, too, the $\left(\frac{Hb}{V}\right)$ quotient is low.

In malarial fever the viscosity of the blood is usually normal or subnormal, rarely above normal. The viscosity of the plasma is normal or increased, the last as a result of hæmoglobinæmia.

In no disease studied could a pathognomonic alteration in the viscosity of the blood be demonstrated.

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SARCOMA AND TUBERCULOSIS.

REPORT OF A CASE.

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Rokitansky,[1] in 1846, declared that tuberculosis and carcinoma are very infrequently found occurring in the same patient. He even believed the two conditions were almost incompatible, and tabulated his reasons for this opinion. A few years later, Lebert[2] disputed Rokitansky's statement because he found 15 cases of tuberculosis among 173 patients with carcinoma. He believed that a patient with cancer could contract tuberculosis as well as any one else, but considered the occurrence of carcinoma in the progress of tuberculosis rare.

These observations stimulated the reporting of cases of carcinoma associated with tuberculosis, so that to-day the literature on that subject is quite abundant. The association of sarcoma with active tuberculosis seems to have been observed very much less frequently. An examination of the post mortem records of about 2500 cases of sarcoma of various organs collected from the literature yielded 19 which showed this combination. In about 100 other cases the tuberculous process was not active.

The cases found in the literature may be grouped in three classes. In the first, the tumor and tuberculosis are primary in the same organ in which the two processes may be either separate or intermingled. Secondly, sarcoma and tuberculosis are primary in adjacent organs and the tumor may or may not grow into the one with tuberculosis. In the third group the lesions are primary in remote organs and there may or may not be sarcoma metastases in the tuberculous organ.

Hildebrand[3] and Schick[4] each reported cases of primary sarcoma of the lung associated with pulmonary tuberculosis. In the former's case the two processes were intermingled. Clement[5] observed an endothelioma of the parotid gland and the entire region of the lower jaw with a focus of tuberculosis near the center of the tumor. In two cases of lymphosarcoma of the intestine reported by Störck[6] and Franco,[7] the tumor and tuberculosis were intimately associated. Freudweiler[8] found tuberculous caseation and lymphosarcoma in the same lymph gland removed at operation. Mueller and Ricker[9] removed a small sarcoma from a breast. Later two nodules appeared in the scar, one sarcomatous the other tuberculous. Tauffer[10] excised an epithelioma which had developed on a lupus lesion, and a mixed spindle-giant-celled sarcoma developed in the scar.

Pulmonary tuberculosis associated with sarcoma of the mediastinum has been observed by Harris,[11] Fowler and Godlee,[12] and Bushnell and Broadbent.[13] In Harris' case the tumor also involved the left lung. Ricker[14] reported a lymphosarcoma of the cervical glands with tuberculosis of the adjacent lymph nodes. An endothelioma of the pia arachnoid of the lumbar cord with tuberculosis of the lumbar vertebræ was reported by Dufour.[15] Bobbio[16] described a spindle-celled sarcoma following three operations on a fistula caused by a tuberculous scapula.

Retroperitoneal sarcomas associated with tuberculosis of the lungs have been reported by Phillipson[17] and McCallum.[18] In the latter's case there were metastases in the lungs. Jscovesco[19] reported a case of tuberculosis of both lungs with sarcoma nodules on the pleura. The site of the primary tumor was not stated. Lazarus-Barlow,[20] in 121 cases of sarcoma, found two associated with active pulmonary tuberculosis. The primary tumor in one case was an endothelioma of the tongue with no metastases; in the other, a round-celled sarcoma of the ischiorectal fossa with metastases in the lungs and other organs.

In addition to the above 19 cases, Rapok[21] has analyzed 141 sarcomas operated on at the Strassburg Surgical Clinic. Among them he found 15 cases associated with tuberculosis. There were 669 tumors of all kinds treated during the same period and 66 of the patients also had tuberculosis. In Rapok's series, the percentage of patients with sarcoma showing tuberculosis was a little higher than the average for all tumors.

Bang[22] analyzed all the cases with tuberculous lesions that came to post mortem at the Commune Hospital in Copenhagen in the 10 years from 1886 to 1895. During this period 6006 autopsies were done and of these 2340 showed tuberculosis in various stages in some part of the body. He found 54 true sarcomas and 34 brain tumors (some of which were probably sarcomas), with which some tuberculous lesion was associated. But in no case was the tuberculosis active.

The following case was first seen by the author at the autopsy table. For the clinical history he is indebted to the house physicians of the St. Louis City Hospital:

The patient was a negress about 60 years old. The family and personal history were negative. When admitted to the

[1] Lehrbuch der allgemeinen Pathologie, Wien, 1846, Erste Auflage, Bd. 1, S. 424, u. 552.

[2] Virchow's Arch., 1852, IV, 214.

[3] Inaug.-Diss., Marburg, 1887.

[4] Inaug.-Diss., Greifswald, 1890.

[5] Revue de la tuberculose, 1895, III, 134; quoted by Franco, l. c.

[6] Sitzungsberichte der k. k. Gesellschaft der Aerzte in Wien, 1895. Abs. in Lubarsch and Oestertag's Ergebnisse, 1898, V. 214.

[7] Virchow's Arch., 1908, CXCIII, 377.

[8] Quoted by Franco, l. c.

[9] Quoted by Franco, l. c.

[10] Virchow's Arch., 1898, supplement to Bd. CLI, 272.

[11] St. Bartholomew Hosp. Rep., 1892, XXVIII, 87.

[12] Diseases of the Throat and Chest, London, 1898, p. 684.

[13] Jour. Path. and Bact., 1909, XIII, 204.

[14] Quoted by Franco, l. c.

[15] Quoted by Franco, l. c.

[16] Giornal della R. accad. di Med. de Torino, 1906, XII, Series 4, p. 452.

[17] Lancet, 1885, I, 937.

[18] Trans. Assoc. Amer. Physicians, 1907, XXII, 391.

[19] Quoted by Franco, l. c.

[20] Arch. Middlesex Hosp., 1904, II, 224, and 1906, VII, 17.

[21] Deutsche Zeitschr. f. Chirurg., 1889-90, XXX, 465.

[22] S. Bang, Tuberkulosins Sammentraef med forskellige andre Sygdomme belyst ved 6006 Sektionsfund, Copenhagen, 1901.

hospital, November 20, 1907, she was emaciated almost to the last extreme. Her temperature was normal, pulse 70, and respiration 26.

The present trouble began two months before admission, when she first noticed a swelling in the epigastrium. It seemed as if food would not pass this point. She lost weight rapidly from the first. About two weeks after she first noticed the swelling, she vomited twice in one day, the first time, a large amount of greenish material, and a few hours later, almost pure blood. She had not vomited since that time. Ascites developed, and during the last seven weeks, she had been tapped three times.

On physical examination, the sclera were white. The heart and lungs showed nothing abnormal. A hard, irregular mass was felt in the epigastrium, being especially prominent to the right of the middle line. What was thought to be the spleen, could be palpated two inches below the costal border in the left anterior axillary line. The abdomen contained much free fluid, which, together with the extreme weakness of the patient, and marked abdominal tenderness, rendered thorough physical examination impossible. The urine contained a trace of albumin, but otherwise showed nothing abnormal. Blood examination revealed a leucocytosis of 34,000 of which 90 per cent were polymorphonuclears, 3,500,000 red cells, and 56 per cent hemoglobin.

The case was diagnosed carcinoma of the stomach.

Patient died on the eighth day after entering the hospital.

The post mortem examination was made about three hours after death.

Anatomical diagnosis: Retroperitoneal sarcoma; tuberculosis of the peritoneum and retroperitoneal lymph glands; chronic aortic endocarditis; atheroma of the aorta; chronic interstitial nephritis; miliary tubercules in the kidneys; atrophy of the spleen.

The body is that of a very old negro woman. Emaciation is extreme. Over the coccyx is a bed sore 1 cm. in diameter. The inguinal glands and one left supraclavicular gland are palpable.

The peritoneal cavity contains 2500 cc. of yellowish, slightly turbid fluid. The great omentum is short, rolled up and adherent throughout most of its length to the descending colon. The diaphragm is partially adherent to the anterior surface of the right lobe of the liver. Adhesions are present between the tip of the left lobe of the liver and spleen. Similar adhesions between subdiaphragmatic peritoneum and spleen enclose a multilocular cavity containing fluid similar to that in the general peritoneal cavity.

The visceral and parietal peritoneum are thickly studded with semi-translucent nodules (tubercles) miliary in size and larger, many of which are confluent. They are most numerous posteriorly between the lower border of the ribs and the crest of the ilium, and in the pelvis. Here the peritoneum is deeply congested. Thin velamentous adhesions stretch from the uterus to the adjoining structures, forming a complete roof over the cul-de-sac of Douglas. These nodules are fewest in number on the posterior surface of the stomach.

Three large tumor masses are visible on opening the peritoneal cavity. The first projects beyond the anterior border of the liver immediately to the right of the gall bladder; the second has grown between the stomach and the transverse colon; and the third projects from under the left costal border in the mammillary line. These masses are parts of a large irregular growth from the posterior abdominal wall between the liver and the root of the mesentery. Superiorly, it is attached to the gall bladder, and to the posterior part of the inferior surface of the liver to the left of the gall bladder. Posteriorly, the tumor lies in direct relation with the right kidney, vena cava, aorta, renal vessels, adrenals and left kidney, being adherent to the latter over the medial half of its anterior surface. On the left, it is adherent to the spleen, diaphragm and splenic flexure of the colon. Immediately inferior to it are the transverse colon, root of the mesentery, and duodeno-jejunal flexure. The transverse colon has been pushed downward in the middle line, but passes upward to the left of the mass in direct contact with, and adherent to, the descending colon to form the splenic flexure which is thus made a very sharp angle. The duodenum passes around the right border of the mass and, in its lower part, by turning backward and downward comes to lie somewhat between the growth and the right kidney. Anteriorly the central portion of the tumor is covered by the stomach, a small part of the duodenum, the gastro-colic omentum and the pancreas.

The pancreas has been pushed forward and upward so that it is no longer in direct relation with either the duodenum, portal vein or spleen. The head lies over the right margin of the growth and measures 2 cm. in its thickest part. The body and tail are stretched upward and to the left over the most prominent part of the growth. The pancreas is definitely separated from the tumor by a capsule.

On cut surface the appearance varies in different parts of the mass. That nearer the spinal column is firmer in consistency than the more superficial part. The color varies from pale yellowish-white to red and purple. Hemorrhages into the tumor are numerous especially in the left half of the mass immediately beneath the peritoneum. The tumor tissue is everywhere soft and friable; in the superficial hemorrhagic areas it is semi-fluid.

Several important structures lie well within the mass. The branches of the cœliac axis are surrounded by tumor tissue, especially the splenic and hepatic arteries. These vessels stand open on section. The course of the portal vein is tortuous, and it is separated from the head of the pancreas by tumor tissue 1 cm. in thickness. The common bile duct is completely surrounded but is patent and bile is easily pressed from the gall bladder into the duodenum.

There is some thickening of the mitral valve. The attached borders of the aortic cusps are calcified and the cusps themselves thickened. In the coronary arteries are numerous atheromatous plaques. The thoracic and abdominal aorta and the common iliac arteries contain numerous atheromatous plaques.

In the apex of the lower lobe of the left lung is a pin-head-

sized partially calcified nodule. The anterior borders are emphysematous. Otherwise the lungs show nothing noteworthy.

The palpable, left supraclavicular gland contains several miliary yellowish-white nodules. The tracheo-bronchial glands are anthracotic and very slightly enlarged. Lying posterior to the œsophagus 2 cm. above the diaphragm, is a gland the size of a small almond, which, on cut surface, shows a soft, white dstinctly limited area 3 mm. in diameter. The spleen is atrophied and its capsule covered with tags of adhesions.

The gastric mucosa is covered with thick blood-stained mucus. In the middle third, especially on the posterior wall, are a dozen or so pin-head-sized ulcers, each containing a small blood clot and extending 1 to 2 mm. into the mucosa. The contents of the intestines are blood tinged in the upper part and black and tarry in the region of the ileocœcal valve and below. Sixty-five centimeters below the duodeno-jejunal flexure, in the attached border of the intestine and extending into the mesentery is a mass 6.5 x 2.5 x 4 cm. It is firmly attached to the wall of the intestine and cannot be peeled off from it. The mass is soft, yellowish-white on cut surface, is very friable and contains two small irregular cavities containing necrotic material.

In the liver are a number of metastases from 0.5 to 1 cm. in diameter. The gall bladder contains dark green bile and numerous soft, small, black stones.

On cut surface both kidneys are red in color, the cortex measures 3 to 5 mm. in thickness and the cortical markings are indistinct. The capsule strips easily, leaving a finely granular surface. On the posterior surface of the left kidney there is one, of the right kidney two pin-head-sized, yellowish-white, opaque nodules. The interior of the urinary bladder is normal in appearance.

In the right ovary there is a small cyst 1.5 cm. in diameter, containing clear fluid. The left ovary is atrophied. The Fallopian tubes are normal except for the tubercles on their peritoneal surface. The uterus is small and its walls contain numerous small interstitial fibroids. The peritoneal surface is thickly covered with confluent tubercles. The cervix shows the results of a lateral tear. No evidence of primary tuberculosis of the genitalia can be discovered.

(The organs of the neck and the brain were not removed.)

Microscopical examination shows the large retroperitoneal tumor to be a typical spindle-celled sarcoma. The tumor mass at the insertion of the mesentery to the small intestine is similar in every respect to the larger growth. Sections cut to determine the relation of the smaller tumor to the wall of the intestine show that in the peripheral part both muscular layers separate the sarcoma from the submucosa. Toward the center the longitudinal muscle fibers, and still further on the circular fibers, completely disappear and the tumor is separated from the submucous layer only by a thin capsule. The muscular coat is not involved in the neoplasm. It has the appearance of having been bevelled off from without inward toward the submucosa and is always separated from the tumor by a thin capsule.

The small nodules in the peritoneum are characteristic tubercules. Many of the sections from the peripheral part of the large retroperitoneal tumor show a narrow rim of lymphatic tissue. In this zone numerous tuberculous foci are found with areas of necrosis and giant cells. The tuberculosis seems to be limited to the remaining retroperitoneal lymphatic structures. In no section has the sarcoma tissue itself been found infected. In the postœsophageal gland, in addition to the metastatic sarcoma, there are two or three very small foci of tuberculosis, but the two processes are always separated. The supraclavicular gland contains tubercules.

Tubercle bacilli were found in a number of sections cut so as to include the zone of lymphatic tissue on the surface of the large retroperitoneal growth.

The chief interest of this case lies in the association of a very rapidly growing retroperitoneal sarcoma with a very virulent tuberculous infection of the peritoneum. It was not possible to determine which condition appeared earliest. The fresh appearance of the tubercules and the exceedingly rapid growth of the sarcoma make it probable that both processes began about the same time. No source of origin of the tuberculous peritonitis could be found although searched for diligently. There were no tuberculous ulcers in the intestine, and the only tuberculosis of the genital organs was on their peritoneal surfaces. The fact that tubercles were more numerous and more often confluent in the pelvic peritoneum may have been due to the effect of gravity in causing the infected peritoneal fluid to collect there.

Of the above 130 cases,[23] tuberculosis was active in 34. Of the 20 cases (including the one here reported) in which sufficient data were given to permit their use in an analysis, tubercle bacilli were actually demonstrated in only 9 and not mentioned in 11. This is an important desideratum since Baty-Shaw [24] has reported a case of sarcoma of the mediastinum associated with pseudo-tuberculosis of the left lung. Grossly, the lesion in the lung closely resembled true tuberculosis, but the bacilli could not be found either in the contents of the cavities nor in sections of the lung.

That sarcoma and tuberculosis are rarely found in the same patient is an admitted fact, but that there is anything incompatible in the two conditions does not appear probable. The case here reported of a very virulent form of both diseases in the same patient would seem to be sufficient to preclude their being incompatible. There is no apparent reason why a tuberculous process should, by chronic irritation, cause the development of a sarcoma, although the cases of Bobbio and Tauffer rather remotely suggest such a possibility. Both of these cases had been operated upon two or more times previous to the appearance of the tumor. Taylor and Teacher [25] have reported cases in which a cancer appeared to cause the de-

[23] If we exclude Bang's 34 cases of brain tumor, some of which were undoubtedly not sarcomatous, the total will be 96 instead of 130.

[24] Brit. Med. Jour., 1901, 1, 1331.

[25] Jour. Path. and Bact., 1909, XIV, 205.

velopment of a sarcoma in the adjacent connective tissue. On the other hand, the general debility and consequent loss of resisting power which accompanies the growth of a sarcoma would prepare the soil for an infection with tuberculosis.

The following are suggested as possible reasons why the two lesions are not more frequently found associated: (1) The age incidence of the two diseases is not quite the same. Sarcoma and tuberculosis affect all ages, but the former is more frequent before 20 and the latter after that age. (2) The rapidly fatal course of a sarcoma may attract attention to itself so completely that the presence of a mild tuberculosis would not be recognized clinically.

CARCINOMA OF THE RIGHT FALLOPIAN TUBE READILY PALPABLE THROUGH THE ABDOMEN.

By Thomas S. Cullen, M. B.,
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Cancer forms a very small percentage of the pathological conditions of the Fallopian tube. As pointed out by Hurdon,[1] carcinoma was noted only three times in the tube, as compared with some four hundred cases of cancer of the uterus that came under our observation in the Johns Hopkins Hospital. Among the more important American articles on this subject are those of LeCount[2] and Hurdon.[3] In the Johns Hopkins Bulletin of 1905, Vol. XVI, p. 399, I reported a case of adeno-carcinoma of the tube in which as a result of extensive involvement of the pelvic peritoneum and of the surrounding tissues I found it necessary to remove not only the entire uterus with the adnexa but also several inches of the sigmoid flexure and about one-third of the pelvic peritoneum.

Alban Doran,[4] of London, has given a complete survey of the literature and collected in all sixty-two cases. A further admirable monograph on the same subject by the same author[5] appeared a few months ago. In this the number of cases of carcinoma of the tube had been increased to one hundred.

After such thorough presentations of the subjects as have been furnished by these authorities a further survey of the literature would be simply a repetition and I shall merely report a case which came under my observation in the laboratory. Its chief interest lies in the large size of the growth. When I first saw the hardened specimen before learning the clinical history, I considered it to be a very large hydrosalpinx or pyosalpinx. On section, however, its true character was readily discernible.

Adeno-carcinoma of the right Fallopian Tube, extension to left Fallopian Tube; very small uterus.

San. No. 2453.—Mrs. M. H., aged 46. Admitted to Dr. Kelly's private sanitarium on May 14, 1907. The patient entered complaining of a mass and great pain in the lower part of the abdomen. The family and past history were negative.

The menses began at 14, were regular, moderate in amount, somewhat painful and usually lasted four days. For the last two or three months the periods have been irregular but profuse. She had one miscarriage when 18. Recently there has been a profuse leucorrhœal discharge which, for the past year, has been associated with some odor and with blood.

Present Illness.—Two years ago the patient first had what she called an attack of appendicitis. The pain was located in the right iliac fossa and was severe and cramp-like in character. It has persisted in this region and for the last year has also been present in the left side. The pain radiates into the leg and for the last four or five months both legs have been swollen.

Operation.—The uterus was removed by bi-section; a small piece of intestine was also removed on account of a little sub-peritoneal cyst which was supposed to be secondary to the tubal growth. There was no glandular involvement and no evidence of any peritoneal implantation.

Path. No. 11536. The specimen consists of a small uterus, of a greatly enlarged right Fallopian tube and of an enlarged left Fallopian tube.

The body of the uterus is 4 cm. long and about 4 cm. broad. It is markedly atrophied. The right tube at the uterus is about 7 mm. in diameter, but after passing outward 1 cm. it curves on itself, becomes markedly convoluted and 5 cm. from the uterus is 5 cm. in diameter. It continues to increase in size until at its outer end it is 10 cm. in diameter. Roughly it forms a sausage-like tumor 14 cm. long, 12 cm. broad, and about 10 cm. in thickness. Anteriorly it is covered with adhesions. Posteriorly it is perfectly smooth and springing from its surface is a sub-peritoneal cyst 1.5 cm. in diameter. Large congeries of blood vessels are seen ramifying beneath the peritoneum.

On section it is seen that the great increase in size is due in a large measure to a new growth. This has extended into the lumen of the tube, but at no point does it appear to have reached the outer surface. Where the tube is 5 cm. in diameter the growth completely fills the lumen. It is composed of a granular-looking new growth which presents a somewhat arborescent appearance. The growth apparently springs from all parts of the wall of the tube. Near the fimbriated extremity, where the tube is 10 cm. in diameter, for over fully half of its extent the walls are covered with a new growth. This in places reaches 2 cm. in thickness. At other points the tube seems to be free from the growth. The entire central portion of the tube has been filled with fluid that has undergone coagulation in the hardening fluid. In the fluid next the growth here and there are large blood clots. The gross picture leaves little doubt that we are dealing with a malignant growth. If it be malignant the reason why it has not extended outside seems evident, because the point of least resistance would be toward the center of the tube.

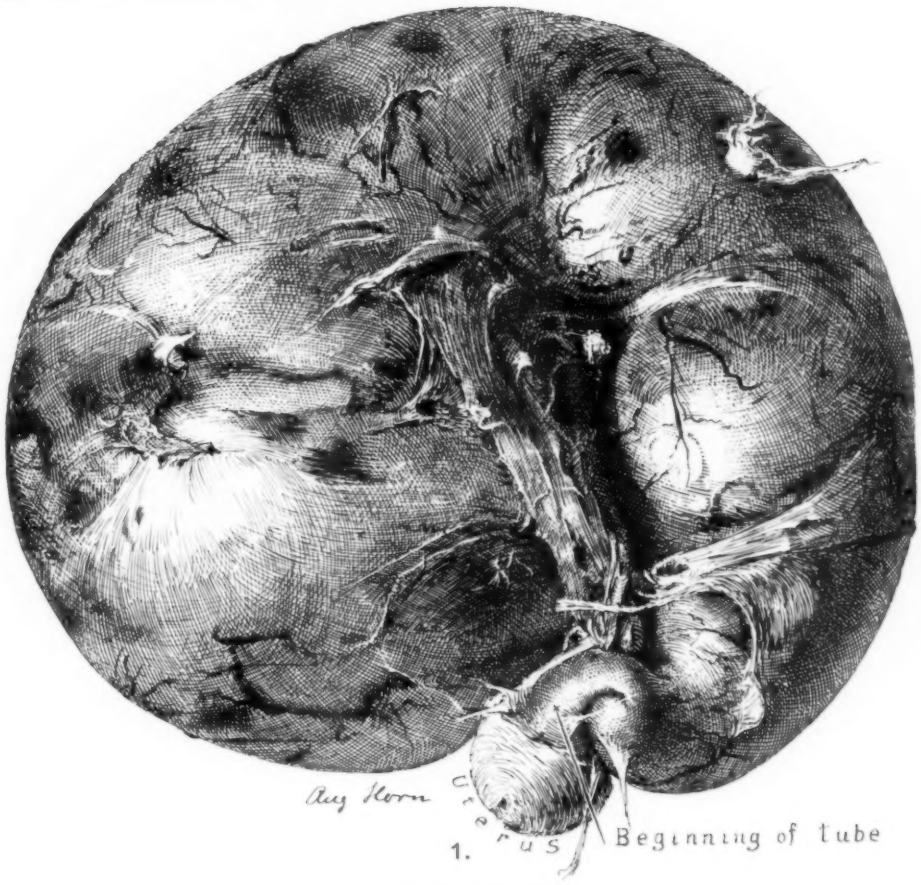
[1] Elizabeth Hurdon, Kelly, H. A., and Noble, C. P. Gynecology and Abdominal Surgery, Phila., 1907-08, I, 175.

[2] LeCount. Johns Hopkins Hosp. Bull., 1901, Vol. XII, p. 55.

[3] Elizabeth Hurdon. Johns Hopkins Hosp. Bull., 1901, Vol. XII, p. 315.

[4] Alban Doran. J. Obst. & Gynæc. Brit. Emp., Lond., 1904, VI, 285.

[5] Alban Doran. J. Obst. & Gynæc. Brit. Emp., Lond., 1910, XVII, 1.



1.

2.

The left tube, near the uterus, is 5 mm. in diameter, but on passing outward a short distance it is dilated to 4 or 5 cm. It likewise on section is found to be the seat of a similar growth. The tube is covered with adhesions.

Histological Examination.—Sections from the growth of the right tube show in some areas little tree-like or teat-like projections extending into the cavity. They remind one very much of the small folds noted where a hydrosalpinx exists. At other points the epithelium has proliferated forming gland-like areas. In more advanced portions over wide areas papillary outgrowths are seen. These present a distinct arborescent appearance and the projections are covered with one or several layers of very high, exceedingly regular cylindrical epithelium. Over large areas there is not the slightest evidence of breaking down. In still other portions of the growth one sees nuclei two or three times the usual size. These stain somewhat deeply. In other portions cross and longitudinal sections of finger-like processes with large blood vessels in their interior are seen. Here and there the epithelium proliferated until solid masses of glands have been formed. Masses of epithelium without evidence of gland formation are also noted. In only a few places is there evidence of breaking down.

The growth is, without doubt, a carcinoma, but is characterized by a marked tendency toward gland formation and papillary outgrowths, and by its stability instead of its tendency toward breaking down. One might, with some propriety, claim that it resembles, to a marked degree, a very cellular and branching papilloma.

It is interesting to note that the other tube presents a similar appearance. One tube may have picked the carcinoma up from the other. The tube walls themselves are not over 1 mm. in thickness. We did not receive the ovaries or the small nodule from the bowel for examination.

We find no record of any other carcinomatous tube that has reached such large proportions.

Post-Operative History.—Sept. 30, 1910. Dr. Curtis F. Burnam kindly made inquiry concerning the patient and finds that there is at present a marked recurrence of the growth, there being a large palpable abdominal mass. The patient, however, is able to do her work most of the time and her general health has been but little affected.

The growth has evidently been a rather slow one as it is nearly three years and a half since operation.

DESCRIPTION OF FIGURES.

FIG. 1.—Primary Carcinoma of the Fallopian Tube. (Natural size.)

The small uterus has been bisected and one-half is seen in the lower part of the picture. The tube at the cornu is small, but after passing outward a short distance rapidly increases in size. Its outer end is so much distended that it might readily be mistaken for an ovarian cyst. The surface of the tube is covered by numerous adhesions and its vessels are large and tortuous. The interior of the tube is shown in Fig. 2.

FIG. 2.—Primary Carcinoma of the Fallopian Tube. (Natural size.)

For the general contour see Fig. 1. In the lower part of the picture is a cross section of half of a bisected uterus. The great increase in size of the tube is in a large measure due to a friable, stringy growth which almost completely fills the lumen. The great distension of the outer end of the tube has been caused by an accumulation of serous fluid which has coagulated in the hardening fluid. This coagulum is seen retracting from the tube wall and could readily be lifted out of the tube in one piece. It will be noted that where the tube is so much dilated its walls over a considerable area are totally devoid of new growth.

IN MEMORIAM.

AUGUST HORN.

On August 19, 1910, our friend and associate, August Horn, died suddenly in Bad Nauheim, where he had gone in quest of health. He had been ill for nearly a year with post-typhoid myocarditis and many of the distressing secondary affections peculiar to this disease. He was buried in Leipzig-Mockau, where his invalid father and mother still live. He was an only son, the pride of humble parents.

Horn's artistic ability asserted itself early, and in 1884 at the age of 15 years, he entered the "Königliche Kunstakademie und Kunstgewerbeschule" in Leipzig, where he devoted his time to the study of the fine arts and, as it was customary in those days in Leipzig's academy, he also took up one of the graphic arts, viz., lithography. This was done to assure himself of a livelihood in case his talent should prove insufficient for creative work. This step I consider fortunate as will appear later. He was always very conscientious and came to excel in all tasks which required a combination of artistic feeling with a high degree of technical skill. On the other hand, in the study of the theory and science underlying art, Horn showed less enthusiasm. But his instinct usually supplied what his mind did not grasp and so well did he observe and analyze that he rarely showed in his work the lack of theoretical study.

The comparative narrowness of artistic ideals in Leipzig caused Horn to become a student in Munich, where he painted for a number of years under several well-known masters. Through his colleagues he became known to wealthy art connoisseurs, and since the life of a poor artist, in a center like Munich, is one of great deprivations, he turned aside, temporarily at least, to become a copyist. He was sent to Dresden, Venice, Milan, Rome and other places with orders to copy famous works of the old masters. These copies were exceedingly well done, faithful even to the technical peculiarities characteristic of each master.

Such was his work when I visited Leipzig in 1898. Having been requested to suggest an artist for Dr. Halsted and his department, if one such could be found, I at once thought of Horn and induced him to give up his work in Italy and become a medical illustrator. He began his work here as illustrator in the surgical service of the hospital in the fall of 1898, and soon demonstrated that his ability was equal to his task. His faithful water color paintings of tumors of the breast and similar drawings are unique and only paralleled by the best French pictures of pathological subjects. In 1901, Horn became a member of Dr. Kelly's staff of artists. His drawings for the "Vermiform Appendix" and "Medical Gynecology" are too well known to require any praise. Later he was engaged jointly by Drs. Kelly and Cullen, for whom he did most of the illustrations of the books "Myomata of the Uterus" and "Adenomyoma of the Uterus." His last work, just begun, was intended to illustrate a book on diseases of the ovary by Dr. Cullen. Many articles in medical journals by Drs. Halstead, Cullen, MacCallum, Hunner, Watts, Holden and others were

illustrated by Mr. Horn, all with great zeal, fidelity and feeling for the artistic possibilities of a supposedly dry subject. To him all things in nature were capable of displaying beauty; he felt its presence, hunted for it, and brought it out in all his drawings with unerring instinct.

Horn's best work was done in the realistic style. There he was a master. In other respects, however, he may have had some deficiencies. He never liked to make diagrams or work out a problem; he also could not draw a picture intended to represent the salient features of a case or of a group of cases. He could not visualize nor generalize, perhaps because his knowledge of medicine as a science was small. He was not a student and his storehouse of anatomical information was limited. Therefore he rarely had a clear mental picture before he began his diagram. He then began to experiment, alter, and usually ended up with a mediocre picture and his spirit downcast. But if given the opportunity of sketching an operation or of drawing a specimen at his leisure, he was in his element: his eye and hand worked together with splendid precision. He knew how to find the inherent beauty of a line or contour, how to illuminate an object so as to produce a perfect symphony of tints and gradations of tones, which fused together so harmoniously that even the dullest object became interesting if pictured by him. With it all he was ever true and faithful in his interpretation of form so that also in regard to scientific accuracy his medical drawings bear close scrutiny. This is a splendid combination and American medical literature is fortunate to have had an artist of Horn's type contribute to its pages.

AUGUST HORN.

Horn's success is, I think, capable of some analysis. His art training was almost identical with that of a number of the best medical illustrators of to-day, viz., Heroux, Unger, the two Keilitz, Kirchner, Becker and others. They were all Leipzig men, brought up in an art school, where drawing and painting were supplemented by splendid training in the graphic arts (lithography, wood engraving, etching, engraving on copper, etc.). In this manner there was acquired, besides a solid draughtsmanship equal to that of many well-known painters, a perfect technique requisite to representations of minute and exact conditions as demanded in medical work. When they chose medical work as their profession they realized that they had to begin to study once more, for while their artistic skill was perhaps equal to the task of a portrait, a landscape, or a composition, they knew little of medicine. The study of medicine from the standpoint of the medical illustrator was tedious work, there being no instructor to guide them. Each was his own teacher and each developed his own style in conception and execution. All of them have achieved a notable success, a success which, though reached in various ways, had, underlying it, a common training which laid stress on accuracy and technical efficiency. I am convinced that this technical efficiency was greatly aided by practise in the graphic arts, by the painstaking attention to detail learned, for instance, in the work of engraving. I mention this again only because it appears that the medical illustrators of the future could with the greatest advantage be recruited from the ranks of art students, who have had a similar training. Certain it is that technical efficiency is demanded more and more in the medical illustrations of to-day. Twenty years ago the original of a medical drawing was often sketchy in character, even careless in technique. The artist usually depended on the wood engraver, lithographer, or etcher to redraw his original and, in doing so, to give it the exquisite finish which we admire so much in the medical works of a generation ago. To-day the cheaper photomechanic processes have supplanted the engraver and the illustration once made is final. The process, however, is sure to bring out all the technical shortcomings of the original with faithful regularity even accentuating their ugliness and it is apparent that a greater technical skill than ever before is demanded of the artist.

August Horn was 41 years of age when he died. The last twelve years of his life, his best years, were given to medicine. He was a serious minded man and his sincere manner and conscientious attitude toward his fellowmen made him much beloved by all who came in contact with him. He had few outside interests, for his whole soul was centered in his work. His untimely death is indeed a serious loss to the art of medical illustration, since a large part of the work done in this line displays the immature efforts of men or women, who have not had the necessary training for such difficult drawing.

MAX BRÖDEL.

NOTES AND NEWS.

At the recent meeting of the Congress of American Physicians and Surgeons held in Washington in May, 1910, a joint session of the American Orthopedic and American Pediatric Societies was held and the subject of epidemic poliomyelitis was discussed. The following resolution was adopted:

"It having been shown by recent epidemics and investigations connected with the same that epidemic infantile spinal paralysis is an infectious communicable disease that has a mortality of from 5 to 20 per cent, and that 75 per cent, or more of the patients surviving are permanently crippled, State boards of health and other health authorities are urged to adopt the same or similar measures as are already adopted and enforced in Massachusetts for ascertaining the modes of origin and manner of distribution of the disease with a view of controlling and limiting the spread of so serious an affection."

A committee with Dr. Robert W. Lovett, president, Boston, Mass., Dr. Irving M. Snow, secretary, Buffalo, N. Y., was appointed to urge the various State and municipal health authorities to take up the work of investigation of the various foci of epidemic poliomyelitis, to study its epidemiology and to instruct the public that the disease is at least mildly communicable.

PERSONAL.

Dr. Frank C. Beall is Professor of Anatomy, Fort Worth University, Forth Worth, Texas.

Dr. John M. Berry is Radiographer and Orthopedic Surgeon, Albany Hospital. His address is 2 Chestnut Street, Albany, N. Y.

Dr. E. Bates Block is Professor of Nervous and Mental Diseases in the Atlanta College of Physicians and Surgeons, and its Visiting Physician to the Piedmont Sanitarium, St. Joseph's Infirmary and the Presbyterian Hospital.

Dr. George Blumer is Dean of the Yale Medical School, Physician to the New Haven Hospital and the New Haven Dispensary, President of the Connecticut Society of Mental Hygiene and Chairman of the Section of Medicine, American Medical Association.

Dr. J. R. B. Branch is Resident Physician and Superintendent, The Macon Hospital, Macon, Ga.

Dr. John R. Caulk is one of the Genito-Urinary Surgeons on the staff at the Washington University, St. Louis. His address is Humboldt Building, St. Louis, Mo.

Dr. R. L. Cunningham is Instructor in Clinical Medicine, Los Angeles Medical Department, University of California.

Dr. C. F. Davidson is Pathologist to the Seattle City Hospital, City Physician and has charge of the Dispensary of the City Hospital. His address is Empire Building, Seattle, Wash.

Dr. Ernest C. Dickson is Assistant Professor of Pathology, Leland Stanford, Jr. University, Fellow of the Rockefeller Institute for Medical Research, and Assistant Pathologist to the Lane Hospital and the City and County Hospital, San Francisco. His address is 2699 California Street, San Francisco, Cal.

Dr. Joseph Erlanger is Professor of Physiology, Washington University Medical School. His address is Forest Park Building, St. Louis, Mo.

Dr. William W. Farr is Physician to the Leamy Home. His address is Chestnut Hill, Philadelphia, Pa.

Dr. Ralph O. Feurbringer is Assistant, Surgical Clinic, University of Marburg, Germany.

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Dr. Campbell P. Howard is Professor of Theory and Practice of Medicine, State University of Iowa, and Physician to the University Hospital. His address is Iowa City, Iowa.

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Dr. J. D. Madison is Attending Physician to the Milwaukee County Hospital and to the Johnson Emergency Hospital, Milwaukee, Wis.

Dr. Harry T. Marshall is Professor of Pathology and Bacteriology at the University of Virginia.

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Dr. Charles F. Nassau is Assistant Professor of Surgery, Jefferson Medical College, Assistant Surgeon, Jefferson Medical College Hospital, Surgeon to St. Joseph's Hospital and Consulting Surgeon to the Frankford Hospital.

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Dr. W. W. Russell is Gynecologist at the Union Protestant Infirmary, the Church Home and Infirmary and the Women's Hospital of Maryland.

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Dr. Louis W. Warfield is Assistant Professor of Medicine, Wisconsin College of Physicians and Surgeons, and Assistant Superintendent and Resident Physician, Milwaukee County Hospital. Address: Wauwatosa, Wis.

Dr. Percy T. Watson's address is Fenchow, Shansi, China, where he is stationed as a medical missionary.

Dr. Harry I. Wiel is Assistant in Medicine in Charge of Tuberculosis Class, San Francisco Polyclinic.

Dr. Otis B. Wight is Lecturer in Gynecology, University of Oregon, and Clinical Assistant in Surgery, Free Dispensary, Portland, Oregon.

Dr. J. Whitridge Williams is Honorary President of the Glasgow Obstetrical Society.

Dr. Paul G. Woolley is Professor of Pathology, University of Cincinnati College of Medicine, Dean of the Medical Faculty and Director of the Laboratories of the Cincinnati Hospital.

NOTES ON NEW BOOKS.

Diseases of the Heart and Aorta. By A. D. Hirschfelder, M. D. 632 pages. (*J. B. Lippincott Company, 1910.*)

The past few years have witnessed an unusual activity in the clinical study of abnormal cardiac conditions. Instruments of precision such as the sphygmomanometer, the polygraph, the electrocardiograph, and the orthodiagraph have furnished data that have added much to our knowledge and have corrected or confirmed opinions that were otherwise impossible of scientific demonstration. This new knowledge has rendered obsolete many of the older text-books. It is a pleasure, therefore, to find in Dr. Hirschfelder's book a careful and critical review of this new material and an attempt to combine it with the older cardiac pathology. In addition to this the relation of clinical conditions to those which are observed in the physiologic laboratory is discussed by one whose original researches on the pathologic physiology of the heart makes his opinion of unusual interest.

The first third of the book deals with the general principles of cardiac physiology, pathology, methods of examination, and therapeutic measures. The conventional anatomic introduction is replaced by a physiologic introduction and throughout this part of the book the physiologic point of view is evident; noticeably in the discussion of the arterial and venous pulses, the effect of exercise, and the action of drugs. The latter two-thirds of the book deals with the various diseases of the heart. The division of diseases is made on the anatomic basis so far as possible. Interesting chapters are introduced on vasomotor crises and angioneurotic lesions, on angina pectoris, on the heart in pregnancy and labor, on heart-block and the Adams-Stokes syndrome, on paroxysmal tachycardia, and on the heart in disturbances of the thyroid. It is to be regretted that the author has not given separate consideration to the common and important changes associated with continuous high blood pressure, with its distinct clinical picture and special dangers. The chapter on the so-called cardiac neuroses is short and indicates the unsatisfactory character of our knowledge of these conditions.

The book is illustrated with numerous photographs, X-ray pictures, drawings, and illustrative case histories. The majority of these are original and highly valuable in rendering more easy an understanding of the subject matter. Each chapter is followed by a full bibliography which adds greatly to its reference value.

On the whole, the book may be regarded as the best that we have in English on this subject. The discussions are often of a theoretical character, too technical perhaps for a general practitioner, but to one who has followed the many recent advances in our knowledge of diseases of the heart, they are instructive and stimulating.

A. W. H.

Fiske Fund Prize Dissertation, No. LIII. The Classification and Treatment of Diseases Commonly Known as Rheumatism. By Frank E. Peckham, M. D. (*Providence: Snow and Farnham Company, 1910.*)

We welcome anything which throws light on the obscure problems of arthritis, but it cannot in honesty be said that this work lessens the darkness. The conditions "known as rheumatism" are classified by the writer as "villous arthritis, atrophic arthritis, hypertrophic arthritis, infectious arthritis and gout." The writer opens with the statement that "A classification must be founded on some logical basis, ..." with which we all agree. But should villous arthritis then be regarded as a special form? Is it not a change which occurs with various joint disturbances and which has in no respect a specific character? For example villous arthritis may occur with traumatic arthritis, with tuberculous arthritis or with what is termed arthritis deformans. Then again when one form is classified on an etiological basis, e. g., infectious arthritis and another on an anatomical basis, e. g., hypertrophic arthritis, can we be regarded as proceeding on a logical basis? The objection is also made stronger by the fact that there is good proof that many of the cases of hypertrophic arthritis are secondary to an infection. The term infectious arthritis—would not *infective* arthritis be a better designation—is used to-day in a very loose way. It would be wiser if we restricted it to those forms of arthritis in which the bacterial origin is definitely proved; as for example, tuberculous or gonorrhœal arthritis.

Much of the treatment advised for these conditions is to be commended, particularly the emphasis which is placed on the uselessness of calling many forms of arthritis rheumatism and directing treatment, especially by drugs of the salicylate class, to that supposed disorder. There are not many who will agree with the author as to the results to be expected from electrical treatment. The man who believes enthusiastically in this is to be envied; the influence of his belief is probably more important that the electricity itself.

Golden Rules of Refraction. By Ernest E. Maddox, M. D., F. R. C. S. Ed. "Golden Rule" Series, No. XII. Third Edition. Revised. Price 1s. (*Bristol: John Wright and Sons, Ltd.*)

What was said of this work in this journal in May, 1903, holds true of it to-day. In very small compass it holds much useful information for students beginning the study of refraction, but we cannot recommend such condensed food as a nutritious diet.

Messrs. Lea & Febiger (Philadelphia and New York) have issued a convenient pocket-sized Practitioners' Visiting-List for 1911. In the diary there is space for recording visits to thirty patients per week. For quick reference there are numerous tables which are useful to the practitioner in his daily work, and also rules for aid in surgical and medical emergencies. It is neatly printed and bound. Price $1.25.

Chronicles of Pharmacy. By A. C. Wootton. Two vols. (*London: Macmillan & Co., 1910.*)

A study of the "chronicles of pharmacy" is likely to lead one into many interesting by-paths and side excursions. Pharmacy, as we know it to-day, can hardly be regarded as other than a prosaic matter, but in its long history it has come through many varied experiences. As the author of this work well states it has been associated "with magic, with theology, with alchemy,

with crimes and conscious fraud, with the strangest fancies, and dogmas and delusions, and with the severest science." The list of those who have contributed to pharmacy is a long one. From Apollo and Chiron the Centaur to Thomas Dover the Buccaneer, we have all sorts and conditions of men.

This work has evidently been a labor of love and bears the marks of having been in preparation for many years. It would be difficult to write such a work in any brief time for the great variety of information must have been obtained from many sources and demanded long and patient search. A pathetic feature was the death of the author while the work was going through the press. In the preface he asks for corrections, which he adds, with prophetic voice, he may not have the opportunity of utilizing.

There is so much of interest in the volumes that it is not easy to choose what should be specially noticed. In the discussion of pharmacy in early times, the myths of the ancients, pharmacy among the Pharaohs, in the Bible, and of the Arabians are dealt with. Of the remedies in use at the time of Hippocrates it is worthy of note that among a list of one hundred and ninety-five drugs, thirty-four are still in use in ordinary medicine and some others are domestic remedies. There is an interesting chapter on the Arabian school of medicine and pharmacy, especially in regard to its influence on European knowledge.

The account of pharmacy in Great Britain has many interesting points and of course describes the great battle over the dispensaries between the physicians and apothecaries. One does not wonder at the protest against the apothecaries when some of the amounts charged for medicines in those days are quoted. The chapters on Magic and Medicine, and Dogmas and Delusions are full of interesting matter and perhaps none is more so than the account of the so-called sympathetic remedies. The most often quoted example is Sir Kenelm Digby's "power of sympathy," but he did not originate the idea. Pliny had the germ of it when he advised that if one should be sorry for a blow given, if he spit into the middle of his hand, "the party that was smitten shall presently be free from pain." Paracelsus was a strong advocate of the value of a sympathetic ointment which was to be applied to the weapon which had given the wound, but he threw out an anchor by saying that it was not of value if an artery was severed or the brain, heart or liver was injured. Robert Fludd, the Rosicrucian, was a warm advocate of the sympathetic ointment, and Madame de Sévigné was another firm believer in this principle of treatment. It is, however, with the name of Digby, that the fame of the power of sympathy is especially associated. The chapters on Masters in Pharmacy and Royal and Noble Pharmacists contain references to many interesting characters and their contributions to pharmacy. Sir Walter Raleigh's Cordial and Bishop Berkeley's Tar Water receive due mention. Under the contributions from chemistry comes the history of many of our modern agents. Many details are given in reference to the discovery of the action of the metals which form so important a part of our materia medica to-day.

The second volume has perhaps even more varied discussions. The use of animals or parts of them in pharmacy makes rather depressing reading, sometimes also amusing. A cure for drunkenness has certainly something to recommend it: "Eels being put into wine or beer and suffered to die in it; he that drinks it will never endure that sort of liquor again." The chapters on some Noted Drugs, Familiar Medicines and Noted Nostrums are full of interesting points. We are to-day returning to the use of ipecacuanha as a remedy for dysentery. This was the disease for which it was employed when introduced into Europe from Brazil by a Portuguese friar in 1625. It was brought specially to notice by Helvetius who cured the son of Louis XIV of dysentery by its use. Many old favorites are discussed, "Dover's powder," "Gregory's powder," "Plummer's pills," "Friar's Balsam," etc. Chapters on Persons in History, Pharmacy in the Nineteenth Century, and Names and Symbols conclude the work.

We can very heartily recommend these volumes to all who are interested in the history of medicine, but it is difficult to imagine that anyone could fail to find something which would repay the reading of them. It is to be regretted that the author did not live to see his work published. He has given us an excellent addition to the historical part of our libraries.

Rational Hydrotherapy. A Manual of the Physiological and Therapeutic Effects of Hydriatic Procedures and the Technique of Their Application in the Treatment of Disease. By J. H. KELLOGG, M. D., etc. Illustrated. Fourth Revised Edition. (*Philadelphia: F. A. Davis Company, Publishers, 1910.*)

Those who desire a large treatise on hydrotherapy will do well to purchase this volume, for they will find the subject treated lucidly and in great detail. The author in his preface states that "while water is recognized as without doubt one of the most valuable of all natural agencies, the writer has never permitted himself to be classed with those enthusiasts who place their trust in it as an exclusive measure. It is best employed in connection with the use of electricity, massage, and medical gymnastics. Rational diet is as essential in the treatment of the majority of cases of acute and chronic disease as is water. In the treatment of chronic disorders the regulation of exercise, dress, and of other habits of life is also a matter of paramount importance; also the disuse of tea, coffee, tobacco, and alcoholic beverages, which are often found to sustain a very direct causative relation to the patients' maladies, and are without doubt responsible for many failures in which the fault has been unjustly charged to the inefficiency of water as a therapeutic agent." This work, of over 1200 pages, is divided into 4 parts. Part I contains 6 chapters: Historical; The Physics of Water, Air, Heat and Light in Relation to Hydrotherapy; Anatomy and Physiology in Relation to Hydrotherapy; The Physiological Effects of External and Internal Applications of Water; the Physiological Effects of Friction or Mechanical Irritation of the Skin; and The Physiological Effects of Light. Part II is in 4 chapters: The General Principles of Hydriatics; The Therapeutic Effects of Hydriatic Applications; General Rules, Principles and Suggestions Relating to the Practical Employment of Hydrotherapy; Hydriatic Institutions and Their Equipment, and the General Management of Cases. Part III has but 1 chapter: The Technique of Hydrotherapy, and Part IV has 4: Hydriatic Prescription Making; Summary of Experimental Work; Hydriatic Measures for Regulating Blood Pressure; and Recent Advances in Hydrotherapy. There is also a very full bibliography and index. After a careful study of this work any doctor should have an intelligent knowledge of the value, uses, and methods of hydrotherapy.

The Surgery of Childhood, Including Orthopædic Surgery. By DEFOREST WILLARD, M. D., Professor of Orthopædic Surgery, University of Pennsylvania. With 712 illustrations, including 17 in colors. Price $7. (*Philadelphia and London: J. B. Lippincott Company, 1910.*)

The volume is dedicated to the late D. Hayes Agnew, M. D., LL. D. The author says that one of the principal objects of the book is to induce the earlier examination and recognition of the surgical diseases of childhood, since irreparable damage frequently follows through delay in investigation or treatment by the attending physician or surgeon. The importance of the clinical examination of each patient is emphasized, but in addition he urges the systematic use of accurate and scientific methods of investigation by instruments of precision. He has endeavored to select and present methods of diagnosis and treatment that in his long experience have proved to be of practical service.

The book is divided into thirty chapters, as follows: I, General Surgical Considerations; II, Surgery of the Head and Face; III, Surgery of the Neck and Chest; IV, Surgery of the Abdomen; V, Surgery of the Genito-Urinary Organs; VI, Burns, Frost-Bites, Boils; VII, Orthopædic Surgery; VIII, Fixation Dressings and Splints; IX, Rotary Lateral Curvature of the Spine; X, Constitutional Diseases Productive of Deformities; XI, Fractures in Children; XII, Tuberculosis of Bones and Joints; XIII, Spinal Caries, Tuberculous; XIV, Spine, Various Surgical Conditions; XV, Pelvis; XVI, Hip-Joint Disease, Tuberculous; XVII, Hip, Various Surgical Conditions; XVIII, Knee-Joint, Tuberculosis; XIX, Knee, Various Surgical Conditions; XX, Ankle and Foot Injuries; XXI, Surgical Conditions of the Shoulder; XXII, Surgical Conditions of the Elbow-Joint; XXIII, Surgical Conditions of the Wrist and Hand; XXIV, Non-Tuberculous Diseases of the Joints; XXV, Non-Tuberculous Bone Diseases; XXVI, Paralysis; XXVII, Talipes; XXVIII, Various Deformities of the Feet; XXIX, Congenital Malformations and Dislocations; XXX, Congenital Deficiencies of Bones.

It is interesting to note that the author advocates nitrous oxide as the ideal anesthetic for short operations on children. This is somewhat at variance with the reports of other authors.

He emphasizes the great importance of economizing the body heat in children by wrapping all portions of the body, outside of the operative area, in cotton covered with wax paper; by the use of electrically heated or hot water operating pads, and by non-exposure of surface before, during and after operation.

There are many references throughout the book, a number of them being from the author's writings, and in addition at the end of the book there is a bibliographical appendix of four pages containing a complete list of his numerous publications.

The illustrations are plentiful and for the most part good, although some, especially those showing instruments, are too small to be of any use.

The book is well written and will be especially interesting to those who have had the privilege of attending Dr. Willard's clinics, and will serve as a very useful and practical reminder of this distinguished surgeon. J. S. D.

A System of Syphilis in Six Volumes. Edited by D'Arcy Power, M. B. Oxon., F. R. C. S., and J. Keogh Murphy, M. C. Cantab., F. R. C. S. With an introduction by Sir Jonathan Hutchinson, F. R. S. Vols. V and VI. Price of each $13.50. (*London: Henry Frowde and Hodder & Stoughton, 1910.*) *Oxford Medical Publications.*

The fifth volume contains paper on "The Affections of the Skin in Syphilis," "Ocular Syphilis," "Naval Syphilis," and "Syphilis in the Upper-Air Passages," and the sixth volume completes this system with a series of papers devoted to a history of this disease "in the more important armies," to various aspects of syphilis in the navy of the United States of America, and the Royal Navy. To this volume also there is prefixed a brief introduction by one of the editors, Dr. Murphy, and the last paper in it is one on "The Value of Justus' Test in the Diagnosis of Syphilis." In both these volumes there are numerous excellent photographs and colored plates. Taken as a whole, it is the most complete System of Syphilis in the English language, and an excellent one. Were it not for the price of the individual volumes it would have a larger sale. The last volume, with a large amount of statistics bearing on this disease as it has appeared in different armies and navies at varying epochs and in many localities is a most interesting one to public health officers and sanitarians, as well as physicians. In the Editors' Afterword occur these sentences which will define the character of the work: "Attention has been called by some of our critics to the amount of repetition in the work when considered as a whole. This appeared to the Editors to be unavoidable, as it was necessary to make each volume as far as possible complete in itself; moreover each article represents the individual and mature judgment of its author, which has sometimes differed from that of other eminent authorities whose conclusions had already been given." Such frankness disarms the critic. He may not agree with the individual writer on many points, but he must not forget that the author is a man of large experience expressing his mature judgment. On "Syphilis," there is probably more disagreement among physicians than on any other disease, due to its proteid form, and great local and individual differences in its severity. If Ehrlich's "606" proves as valuable as is now hoped it will, much of the treatment advocated in this volume will be antiquated in a few years, but the System will still remain a notable one, most valuable to all syphilographers.

A Treatise on Diseases of the Eye. By John Elmer Weeks, M. D., etc. Illustrated (*New York and Philadelphia: Lea & Febiger, 1910.*)

This is a thoroughly satisfactory text-book on the Diseases of the Eye. Throughout it shows that the author has very carefully planned a text-book based on his own personal experience and knowledge, without using any existing text-book as a model. The author has been thoroughly alive to the fact that there have been many valuable and important contributions to ophthalmological literature in recent years, and he has judiciously incorporated this material into the text—the result being a new and thoroughly modern text-book, showing a forceful individuality.

All pathological and bacteriological matter pertaining to Eye Diseases has been most fully and carefully considered, and in such a manner as to show that the author is not only an ophthalmologist, but a real pathologist as well.

We commend this book to all students. We believe that Weeks has produced the best American text-book on the eye written up to the present time—a book which is in the same class as the German "Fuchs," which is equivalent to saying, without further commendation, that it is an extraordinarily excellent text-book on Eye Diseases. B. B. Browne, Jr.

Refraction and Motility of the Eye. With Chapters of Color Blindness and the Field of Vision. Designed for Students and Practitioners. By Ellice M. Alger, M. D., etc. Illustrated. Price $1.50. (*Philadelphia: F. A. Davis Company, 1910.*)

This book was a distinct disappointment to the reviewer. A modern text-book setting forth the methods and practices of the present-day oculist used in correcting the refraction-errors of the eye would be a welcome addition to the many very excellent text-books on the Diseases of the Eye which we have. This book, in the main, only states the familiar optical laws found in most text-books. A considerable amount of irrelevant subject matter helps to increase the size of the volume, while much material, which ought to be found in its pages is either omitted or dismissed in a few words. Sufficient attention is not given to the various astigmatic tests, nor to the make up of trial cards, their illumination, etc. The book contains many devitalized facts, in the main correctly stated, but it would not be possible to acquire valuable and comprehensive knowledge of practical refraction from its pages, and we do not believe that it satisfactorily meets the needs of any class of readers.

B. B. Browne, Jr.

Pathogenic Micro-Organisms, Including Bacteria and Protozoa. By William Hallock Park, M. D., and Anna W. Williams, M. D. Fourth edition, enlarged and thoroughly revised. (*Philadelphia: Lea and Febiger, 1910.*)

We have previously had the opportunity of calling attention to the excellent text-book on Pathogenic Bacteria and Protozoa by Park and Williams. The present edition deserves no less praise

than former editions and like its predecessors can be especially recommended to physicians who are interested in public health work.

The methods of bacteriological diagnosis employed at the Research Laboratory of the Board of Health of New York City form the basis of the book, although the methods employed in other laboratories are by no means neglected. The chapters on Tuberculosis, Diphtheria, and Typhoid Fever are especially to be praised since they include not only excellent descriptions of the cultural characteristics of the organisms concerned in these infections, but also many of the investigations in the field of Immunity and Serum Therapy, which have resulted from the bacteriological study of these diseases. The other pathogenic bacteria are well described and the methods for the isolation of the various microörganisms concerned in Human Pathology are clearly and accurately given. There are, however, certain features of the book which, from the standpoint of the teaching bacteriologists, are to be criticized.

For the average student it seems as if too much attention has been devoted to certain organisms and too little space given to the description of other no less important pathogenic bacteria. Thus the chapters on Tuberculosis and on Diphtheria occupy nearly 40 pages each, and that on the Typhoid Bacillus, nearly 30 pages, while the description of the Gonococcus and its characteristics is limited to 7 pages, that of the Meningococcus to a little more, and the Plague Bacillus receives an inadequate description confined to 4 pages. For the student of Bacteriology these latter organisms are quite as important as the former.

Again the methods in which organisms are grouped are also open to much criticism, and it is difficult to see exactly the reason why certain bacteria are included in the same chapters. Thus the Micrococcus of Malta Fever and the Micrococcus Zymogenes of MacCallum and Hastings are placed in the chapter with the Gonococcus, and the Bacillus of Soft Chancre, an arrangement for which there is no justification, either from the cultural characteristics of the organisms, or from their pathogenic action. The Anthrax Bacillus is grouped with the pathogenic anærobes, and the essential differences in the methods which must be employed in the cultivation of these various organisms are not clearly brought out. The attempt has also been made to classify certain organisms derived mainly from the intestinal tract according to their cultural characters, regardless of certain well-marked morphological distinctions and a hopeless mix-up has resulted. The encapsulated bacteria which form a distinct group of microörganisms are placed with *Bacillus coli*, *Bacillus typhosus*, and *Bacillus para-typhosus*, and with them is included the microörganism of swine plague with entirely different cultural characteristics. This latter organism indeed should be the type organism for the hemorrhagic septicæmia group in which the author places several infections of man, although the resemblance of these diseases and the microörganisms thus far encountered in them to the condition of hemorrhagic septicæmia in lower animals is by no means clearly marked.

No attempt is made to apply correct botanical names to the various bacterial species, an unfortunate omission for the student since bacteria come strictly under the rules of botanical nomenclature, and when these rules are properly applied with the name of the author first correctly designating the organism, many of the historical facts of bacteriology are impressed upon the mind.

Finally there are a number of investigations of the first rank by American bacteriologists which have received scant attention. The work of Jordan and Harris on Milk Sickness is not included, and the investigations of Dorset, Bolton and McBride on the etiology of Hog Cholera are not mentioned. The last-named investigation has now been repeated in many of the bacteriological laboratories abroad, the results of these men have been abundantly confirmed and this piece of work stands out as one of the finest achievements that has ever been made by bacteriologists in this country.

The book in our estimation contains a large amount of very valuable information, and can be especially recommended to the practicing bacteriologist. The faults which we have mentioned are but minor points of arrangement and detract but little from the great value of the work.

The section of the book devoted to Protozoölogy, written separately by Dr. Williams, leaves nothing to be desired in the way of concise, clear description of the protozoa, and like the Bacteriology proper is especially to be praised for the diagnostic methods which it emphasizes.

Report on the Measures Taken Against Malaria in the Lahore (Mian Mir) Cantonment. By THE HONORABLE MR. R. NATHAN, C. I. C., I. C. S.; LIEUTENANT-COLONEL H. B. THORNHILL, C. I. C., I. A.; and MAJOR L. ROGERS, M. D., F. R. C. P., F. R. C. S., I. M. S. 1909. (*Calcutta, India: Superintendent Government Printing, 1910.*)

This report is divided into the seven following parts: 1, Preliminary; 2, Description of Lahore Cantonment; 3, First Series of Experimental Operations in Lahore Cantonment; 4, General Anti-Malarial Operations in the Cantonment; 5, Result of General Anti-Malarial Measures; 6, Summary of Conclusions; and 7, Applicability to India of Measures Adopted in Other Parts of the World. To all interested in the problem of the extermination of malaria this is a most valuable report, for in spite of the best efforts of the military officers and physicians, and of admirable work done, it has not been possible to reduce the prevalence of this disease in the Lahore Cantonment. In fact the results are very similar to those that have followed the introduction of the water filtration in Washington, D. C., where though the plant to this end is as good as can be, the diminution in the amount of typhoid fever has not followed as was expected. It merely shows that in all these problems there are many factors which have yet to be carefully studied and worked out.

Naval Hygiene. By JAMES DUNCAN GATEWOOD, M. D. Instructor in Naval Hygiene, U. S. Naval Medical School, Washington. Medical Inspector, U. S. Navy. Illustrated. Price $6. (*Philadelphia: P. Blakiston's Son & Co., 1909.*)

This book on Naval Hygiene, by Dr. Gatewood, is written especially from the standpoint of a medical man occupied with the problems of naval hygiene, and is designed primarily for the students interested in this field of medicine. It cannot be looked upon as a mere record of scientific facts, although a scientific basis for the practical work outlined in this book is clearly indicated.

The book is divided into eight chapters. The first chapter deals with naval vital statistics, and in it the author dwells at length upon the various forms of disease met with in tropical and temperate climates and attempts to show the varied susceptibility or immunity which the enlisted men exhibit towards these diseases. The tables giving the sick rates, death rates, etc., are well arranged and are of great value in the interpretation of vital statistics.

In the second chapter the problem of the ventilation of ships is taken up, and emphasis is laid upon the necessity for a proper ventilation of all the different parts of the vessel. The various methods employed to rid vessels of obnoxious odors and gases are enumerated and the clear distinction between the theoretical ideas of the trained laboratory man concerning ventilation and the practical difficulties encountered on ship board in carrying out these ideas is clearly indicated. In our opinion this chapter is the most interesting and the best written of all the chapters of the book.

The third chapter deals with the problems of light and em-

phasizes the effect of well-lighted quarters upon the physical and mental health of the enlisted men, and in this chapter the author maintains that gloomy surroundings have a far greater influence upon the health of the men than is generally supposed.

The other chapters of the book deal with such problems as water supplies, drainage, food, clothing and disinfection. In the chapters dealing with disinfection the various methods employed on board ship are given, and the numerous duties of the officers at the recruiting stations are described. The importance of a more stringent examination of the applicants for enlistment at the recruiting stations is indicated, and Dr. Gatewood is inclined to put the responsibility of much of the high sick rate on board ship upon the recruiting officer, believing that many individuals are permitted to enlist, even though they are physically unfit to withstand the routine of ship life.

The book is well written and will, we believe, prove of great value to the student of naval hygiene bringing together most of the important facts and principles to be known in this field. Had the author condensed his material into a smaller volume he would have added greatly to the value of his publication.

Osteology and Syndesmology. By HOWARD A. SUTTON, M. D., etc., and CECIL K. DRUKER, B. S. Price $1.50. (*Philadelphia: P. Blakiston's Son & Co., 1910.*)

The authors endeavor in this work to present these two subjects in a way to make them more easily learned than they can be in the usual anatomical text-books. "The bones follow one another in the order found simplest and most useful in presenting the course in osteology at the University of Pennsylvania. Summaries occur at the end of every section, which is not a summary in itself. It is hoped they will facilitate review and will be of service in the quizzing of the student with his fellows—a method of work most necessary in such a course. Each joint is discussed after the bones which compose it, instead of in a separate division at the end of the book." These quotations from the preface show the arrangement and purport of the book—a form of quiz compend. Such a work finds a welcome place on the book-shelf of many a student, but it cannot take the place of a more scientific anatomy.

Hernia: Its Cause and Treatment. By R. W. MURRAY, F. R. C. S., etc., Illustrated. Second Edition. Price 6s. (*London: J. & A. Churchill, 1910.*)

This brief treatise on hernia is merely an exposition of the author's views and practice on the subject—it does not pretend to be more than this. The author believes that inguinal hernia, in the large majority of cases, is due to a sac of congenital origin, which is entirely separate from that which involves the tunica vaginalis, and that this "Saccular Theory" is applicable to all forms of hernia. He has had as good success with his operation as many other surgeons have had with theirs, and it must be left to those interested in hernia to read the book carefully and decide on the relative merits of the operation.

The Hand-Book of Electro-Therapeutics. By WILLIAM JAMES DUGAN, M. D. With ninety-one illustrations. (*Philadelphia: F. A. Davis & Co., 1910.*)

This is a work which deserves special attention from physicians interested in this branch of medicine. It will also richly repay careful study by the general practitioner who, knowing nothing about electricity, ignores its great usefulness in the treatment of a variety of disorders, some of which are very intractable to other means of treatment—for example neuritis.

The book is written in a clear and concise fashion. The different kinds of electric currents and their uses are described at sufficient length for a work which deals with so extensive a subject in so small a compass. A large variety of useful apparatus is amply illustrated.

That treatment by electricity has been greatly abused by the unscrupulous and by those who had little knowledge of physiological or pathological conditions, there can be no doubt.

For instance the author speaks of the extensive use made of the high frequency current in the treatment of hysteria; he points out that it is irrational to use a current which lowers blood pressure in a disease where blood pressure is already below normal, instead of using the static current which would tend to reestablish normal arterial tension, without sacrificing any of the psychic effect.

In the treatment of goitres, carcinoma, enlarged prostate and other surgical diseases, the author very properly specifies that electricity should not be used unless a radical operation is for some reason contraindicated, or as an auxiliary after operation to build up the general health of the patient. The chapters on Magnetism, Heat and Light, and Death by Electricity were to the reviewer, particularly interesting and instructive.

By way of criticism the reviewer has nothing to say unless it be to the publisher for the mistake in Fig. 70, between pages 126 and 127, where an "X-ray" plate of an ankle (anterior view) is called a wrist.

The book, taken as a whole, is a very strong plea for the more extended use of electrotherapeutics by members of the profession who, being satisfied that this important agent rests on a firm scientific basis, will use it as such, and not as a mere vehicle for suggestion. JOHN SEBASTIEN DERR.

Practical Physiological Chemistry. A Book Designed for Use in Courses in Practical Physiological Chemistry in Schools of Medicine and of Science. By PHILIP B. HAWK, M. D., Ph. D., etc. Third Edition. Revised and Enlarged. Illustrated. Price $2.50. (*Philadelphia: P. Blakiston's Son & Co., 1910.*)

That this book has met with approval is seen by the fact that this edition has followed the second within a year. In its present form certain corrections have been made and "a number of qualitative tests and qualitative methods," that are new, have been added. The work was favorably commented upon in this Journal, December, 1909.

A Treatise on Orthopedic Surgery. By ROYAL WHITMAN, M. D. Fourth Edition. Revised and enlarged. Illustrated. (*Philadelphia and New York: Lea & Febiger, 1910.*)

The author states in his preface that "this edition has been thoroughly revised. New material and new illustrations have been added, and in its present form it is believed that the book fairly represents this department of medicine at date of issue." The importance of the illustrations was drawn attention to in the review of this book which appeared in the BULLETIN in August, 1907. Its value as a treatise on Orthopædics was noted, and in its present form this work is a most excellent one, and especially serviceable to students from the clearness with which matters are presented, and the authority given it by the author whose work in orthopædics is recognized as preeminent in this country.

Normal Histology with Special Reference to the Structures of the Human Body. By GEORGE A. PIERSOL, M. D., Sc. D., Professor of Anatomy in the University of Pennsylvania. 438 illustrations many of which are in colors. Eighth Edition (rewritten). Price $3.50. (*Philadelphia and London: J. B. Lippincott Company.*)

The author's aim has been, to quote from the preface, "to present descriptions which should include the salient features of the various structures with sufficient fullness to impress important details without wearying minutiæ; too great conciseness, on the

one hand, and too great elaboration of detail, on the other, are alike unsatisfactory."

A satisfactory middle ground has been reached in the clear and concise presentation of the essential features of the various organs and tissues.

The book is adequately illustrated, the excellent figures bearing out the author's statement that the preparations, from which they were drawn, were selected to show the usual rather than the unusual histological appearances.

One feature of the work is the insertion in certain instances of a brief outline of the macroscopic features of an organ before the microscopic appearances are described.

The book will be especially appreciated by students beginning their work in Histology, for whom indeed it is primarily intended.

A Manual of Physiology With Practical Exercises. By G. N. STEWART, M. A., M. D. Edin., etc., Professor of Experimental Medicine in Western Reserve University, Cleveland. With colored plates and 450 other illustrations. Price $5. Sixth Edition. (*New York: William Wood & Co., 1910.*)

The third edition of this work was reviewed in the BULLETIN in May, 1899. That three more editions have been called for since then shows that its merits to which attention was called have made it a favorite text-book with students. It has grown larger with its years of age, but it has at the same time become a better work, and thus its success is well deserved. It is not an easy book to learn from, but the student who has mastered it will be thoroughly well grounded in the principles of physiology.

Paludism—Being the Transactions for the Study of Malaria in India. Edited by MAJOR S. P. JAMES, M. D., I. M. S. Issued under the authority of the Government of India by the Sanitary Commissioner with the Government of India, Simla. (*Simla: Government Central Branch Press, 1910.*)

This is the first number (July, 1910) of a new journal on Paludism to be issued at "irregular intervals." Special students of malaria will be interested to note its appearance, as there are so many questions still to be solved in regard to this disease, and India is one of the countries which suffers greatly from it, and where the chances to study it are especially good. The famous discoveries by Ross, in relation to the malarial parasite and its propagation, were made in India, and there is little doubt that other valuable information will come from the well-trained English medical officers in that country. This number contains some important "Notes on Mosquitoes," and unquestionably this new journal will be required by all those who wish to be masters of the subject.

The Essentials of Histology. Descriptive and Practical. For the use of Students. By E. A. SCHÄFER, M. D., etc. 8th Edition. Price $3.50. (*Philadelphia and New York: Lea & Febiger, 1910.*)

This edition varies but little from the seventh which was favorably noticed in our columns, December, 1907. In its new form it is a little larger, but this increase in size is due mainly to a greater number of illustrations, many in colors. These make the work a most helpful one to students, and its numerous editions are a proof of its merit.

Pulmonary Tuberculosis and its Complications. By SHERMAN G. BONNEY, A. M., M. D. Second Edition. Price $7 net. (*Philadelphia: W. B. Saunders Company, 1910.*)

The first edition of this book was reviewed in the BULLETIN of June, 1909. Additional material and chapters increase the already voluminous collection of facts. It is to be regretted that data are often cited in such profusion as to leave their bearing on the topic discussed rather indistinct. Not always does the author correlate clearly his large material. In this edition we find the chapter on bacilli resembling the tubercle bacillus, enlarged and admirably improved. In the discussion of the relation between the human and bovine types, Detre's scheme of differential diagnosis is given extended notice without any hint of the serious doubts thrown upon it by various authors. The statement as regards the excessive use of the subcutaneous tuberculin test for diagnosis is to be heartily commended, and deserves wide circulation. But the recommendations as regards the maximum dose to be employed, if the method must be resorted to, are unnecessarily cautious. There is in this chapter, too, an unfortunate confusion in the use of "local" for both "local" and "focal" reaction. In the section on the cutaneous and ophthalmic tests, there is not enough emphasis laid upon the almost utter uselessness for diagnosis in adults of the positive cutaneous reaction, nor is there made clear the importance of observing the percentage strength of the solutions used for the eye tests. That, at present, little help is derived from the Röntgen Ray in early diagnosis, is a justifiable conclusion. The new chapter on the Regulation and Restriction of Travel for Consumptives, shows the growing demands of our social sense. The chapter on Immunity is the least satisfactory. The facts are not well selected, and the discussion not judicious. In spite of the faults cited, the reader will find the book full of most valuable information. S. W.

Hookworm Disease. Etiology, Pathology, Diagnosis, Prognosis, Prophylaxis and Treatment. By GEORGE DOCK, A. M., M. D., Professor of the Theory and Practice of Medicine, Medical Department of Tulane University of Louisiana, New Orleans, and CHARLES C. BASS, M. D., Instructor of Clinical Microscopy and Clinical Medicine, Medical Department of Tulane University of Louisiana, New Orleans. Illustrated with fifty-nine special engravings and colored plates. Price $2.50. (*St. Louis: C. V. Mosly Company, 1910.*)

So much attention has been given to the prevalence of the Hookworm Disease in the South, both by the press at large and the great numbers of articles appearing in the medical journals that we feel sure a treatise on the subject is most opportune.

In a book of 250 pages, Dock and Bass have given an excellent résumé of what is known concerning the Etiology, Pathology, Diagnosis, Prognosis, Prophylaxis and Treatment of this disease. Beginning with a most interesting historical review of the subject we find complete chapters devoted to the geographic distribution and economic importance of the disease, its zoölogic features, pathologic anatomy, and symptomatology; each chapter is replete with illustrations.

To the practicing physician we particularly recommend the chapters devoted to the diagnosis and treatment of the disease. The remarkable results obtained through the use of Thymol makes this drug almost a specific.

While the book has been primarily written for physicians, hygienists, employers of labor, and others interested in sanitation will find valuable information within its covers.

J. S. B.

Progressive Medicine. Edited by HOBART AMORY HARE, M. D., assisted by LEIGHTON F. APPLEMAN, M. D. Vol. III. September, 1910. (*Philadelphia and New York: Lea & Febiger, 1910.*)

The latest and most important papers on "Diseases of the Thorax and its Viscera, including the Heart, Lungs and Blood Vessels," on "Dermatology and Syphilis," on "Obstetrics," and on diseases of the "Nervous System" are reviewed and discussed in this volume. What makes this series valuable is first the selection of the papers out of the immense mass of material constantly appearing; and second, their treatment—their careful grouping, and the broad review of the subject in hand by the

editor of the section. The different departments of medicine are well treated, and the busy practitioner can get much help out of these volumes.

International Clinics. Edited by HENRY W. CATTELL, A. M., M. D. Vol. III. Twentieth Series. (*Philadelphia and London: J. B. Lippincott Company, 1910.*)

Out of the many interesting papers in this volume it is difficult to select one as more worthy than the rest of special notice. There are articles on Diagnosis, Treatment, Teeth and Oral Cavity, Gynæcology, Medicine, Surgery, Miscellany, and A Medical Home-Coming Week, and specialists in any of these departments will find noteworthy contributions to their own line of work. These articles do not appear in other journals, so that this series records a very large number of rare clinical histories.

Diseases of Infancy and Childhood; their Dietetic, Hygienic and Medical Treatment. A Text-book designed for Practitioners and Students in Medicine. By LOUIS FISCHER, M. D., Attending Physician to the Willard Parker and Riverside Hospitals, etc. Third Edition. Illustrated. Price $6.50. (*Philadelphia: F. A. Davis Company, Publishers, 1910.*)

A review of the first edition of this book appeared in the BULLETIN two years ago. The issue of the third edition of a work of this magnitude indicates that it has met with gratifying success. In the present issue several new chapters have been added as for example on epidemic cerebro-spinal meningitis and its treatment by the Flexner serum and lumbar puncture, on scabies indicanuria, acetonuria, and diabetes. New illustrations have also been added.

If any criticism of the book as a whole were offered it might justly be said that too much space in it is given to too many subjects. For instance the chapter on the bacteria of the intestines would be equally valuable if the bacteria were described in less detail and the results of more recent investigations had been embodied in it. The same objection might be urged to the account of the bacteriology of diphtheria. This information might have been much abridged without, in any manner, lessening the value of the chapter which is perhaps the strongest in the whole book. These, however, after all are minor defects and the present edition is a valuable manual for the guidance of practitioners who are treating the diseases of infancy and childhood.

A Manual of Hygiene and Sanitation. By SENECA EGBERT, A. M., M. D., etc. Fifth Edition. Enlarged and thoroughly revised. Illustrated. Price $2.25. (*Philadelphia and New York: Lea & Febiger, 1910.*)

This excellent manual has a well-deserved popularity. The fourth edition was favorably reviewed in this Journal (December, 1907) and the new edition is an improvement on the last. We again cordially recommend it to all who desire a small work on this subject.

The Essentials of Materia Medica and Therapeutics for Nurses. By JOHN FOOTE, M. D., Assistant Professor of Therapeutics and Materia Medica, Georgetown University School of Medicine. (*Philadelphia and London: J. B. Lippincott Company, 1910.*)

This volume of about 200 pages is designed, as its title indicates, to furnish a knowledge of the essentials of Materia Medica and Therapeutics. It is the view of the author that text-books on these subjects, written for the use of nurses, have often been too complicated and the task, on the part of the pupil nurse, of selecting the essential knowledge for the performance of the work, has been rendered unnecessarily difficult. The methods given for converting apothecaries' weights and measures into metrical weights and measures are clearly given and ought to relieve the minds of nurses of a serious burden. The descriptions of the actions of drugs and especially of the untoward effects of drugs are clear and terse. The book, as a whole, is a good one and will serve a useful purpose in the instruction of nurses.

Lippincott's New Medical Dictionary. A Vocabulary of the Terms Used in Medicine, and the Allied Sciences with their Pronunciation, Etymology and Signification. Including much Collateral Information of a Descriptive and Encyclopædic Character. By HENRY W. CATTELL, A. M. (Laf.), M. D. (U. of P.), etc. Freely illustrated with figures in text. Price $5. (*Philadelphia and London: J. B. Lippincott Company.*)

The character of modern dictionaries has very much changed from that of their early predecessors. To-day they are encyclopædic in character, and there is much more information to be found in them. This change, while valuable in many respects, has its dangers as well; the last edition of Webster's "New International Dictionary" is an example both of how a dictionary may be improved, and harmed by adding to it much information, which really belongs to an encyclopædia. This new medical dictionary shows the same advantages and disadvantages. Where the simple definition, derivation and use of words are not adhered to, there is no limit to what may be added or left out of a dictionary in the way of information; and so each will vary, depending on the editor. Lippincott's appears to be an excellent book, and if the user will first read the introduction (a task very few users of dictionaries will put themselves to) the use of the dictionary, and its values, will be much more readily comprehended.

Granting that the choice of his material and its use must be left to the editor, yet it may be permitted to make some reflections on certain points.

Why should French words, for instance, be found in an English dictionary? *e. g.—sonde*, its English equivalent, is just as good and there is no need to adopt this foreign word; *aï crépitant* is another example, and also *aboiement*.

It seems mere waste of space to name all the varieties of sutures, or to give all the names of different organisms to which syphilis has been attributed under the title Bacillus of Syphilis, since to-day we know that there is one and only one organism which causes this disease.

Under the headings "regio," "abscess," "hyper," and "malignant" we find all sorts of combinations which any school boy ought to understand without needing to look them up in a dictionary. To omit these would save much space.

Other compound terms like "pin-hole pupil," and "school-made chorea" might, it seems to us, be fitly omitted.

The gold-tail moth, with a reference to the Lancet, is unknown to us, while the brown-tail variety is now known to all the Eastern States and causes a dermatitis. To the latter variety there is no reference. As mere misprints we note under "sweat-fever" its definition anglicus sudor [sic]; under sweating-fever, Anglicus Sudor [sic], and on page 653, under the illustration of opisthotonos, occurs "Grande hysteria" which either should be grand hysteria or *grande hystérie*.

The illustrations are as a whole of almost no value, but otherwise the book, as a piece of book-making, is most satisfactory.

Practical Nursing. For Male Nurses in the R. A. M. C. and Other Forces. By MAJOR E. M. HASSARD, R. A. M. C., and A. R. HASSARD. Price $1.50. (*London: Henry Frowde and Hodder & Stoughton, 1910.*) *Oxford Medical Publications.*

This book, with slight modifications, could be well used by any army medical corps, whether male or female nurses are employed. It has been carefully prepared and covers the ground satisfactorily. In a later edition, to make the work more generally serviceable, it would be well to omit such terms as "Higginson syringe" or "Neville cradle" as these names mean nothing to the

foreigner. It seems doubtful whether such large doses of brandy, as are mentioned on p. 228, for a child should ever be used, and the dose of diphtheria antitoxin for a child is usually less—not "the same" (p. 287) as for an adult. It is stated (p. 238) that the orderly in dressing a case of cancrum oris is allowed to smoke as the odor is nauseating. Female nurses do not smoke, and there is no good reason why male nurses should when so occupied. The directions for counting sponges (p. 200) before and after an operation are not the best control against leaving one in the abdominal cavity. "Practical Nursing" is none the less a thoroughly good and reliable guide.

A Text-Book of Pathology. By JOSEPH MCFARLAND, M. D., Professor of Bacteriology and Pathology in the Medico-Chirurgical College, Philadelphia, etc. Second Edition. (*Philadelphia: W. B. Saunders & Co., 1910.*)

The general arrangement of this book corresponds to that of the first edition. Aside from a differentiation into general and special pathology there seems to be very little selection in the grouping of subjects especially in the first half of the book. After discussing the pathology of nutrition and circulation in such detail as one could hardly expect to find in a book of this size, the author gives us a brief description of the cell and its life and follows this by three chapters on Regenerative, Retrogressive and Progressive tissue changes. In the first of these the healing of wounds is briefly considered, in the second aplasia and hypoplasia are separated by pages on infiltrations (fat, glycogen, serum, calcium, bone—under this, neoplasm—pigment) and degeneration, (fatty parenchymatous, etc.) from the paragraph on atrophy. This is followed by necrosis. In the third hypertrophy and tumor formation are discussed. Such an arrangement marks a radical departure from the customary arrangement and without any explanatory note seems to offer no advantages.

This is emphasized later. Inflammation and repair usually considered together are as we have seen separated. Repair is first considered under regenerative tissue changes and inflammation the natural precursor of repair only follows hundreds of pages later under the ambiguous heading of infection and infectious diseases. Even allowing this, the chapters on inflammation leave one disappointed for the author devotes pages to the morphology and cultural characteristics of the organisms concerned in the process and relatively little to the parts of the subject usually liberally discussed. Throughout the book this portion of the subject is unsatisfactory and cannot compare with such presentations of the subject as Adami and others offer.

The second half of the book on Special Pathology is hardly more satisfactory. Let us analyze the chapter on Diseases of the Cardio-Vascular System. Without any preliminary embryological consideration the author plunges us into the malformations which are only comprehensible from a developmental aspect. Pericarditis follows and the presentation lacks unity and sequence to such an extent that the reader finds himself with a few isolated facts which should be related but are not, and so on through the myocardium. The fatty heart which on section allows oil droplets to escape and which imperils the life of the individual, the parenchymatous myocarditis which results in death from cardiac palsy and the myomalacia cordis which the author emphasizes are to say the least rare. The lack of histological description is most striking. In this chapter histological description of an antemortem clot and its mode of formation is not even hinted at (this is also very summarily discussed in the discussion of Thrombosis and Embolism in the General Pathology). This is in strong contrast to the pages devoted to pathological physiology of cardiac diseases with descriptions and tables of the murmurs.

The book is rather profusely illustrated. Many of these are borrowed, and these are the best. On page 117 there is a very good drawing by Chase of an hemorrhagic infarct. This same picture is later reproduced (p. 171) as an anæmic infarct. The object of this is obscure. The great dearth of histological illustrations, some 40 odd in the portion of the book devoted to Special Pathology, is striking and even these few do not compare with such illustrations as are found in Woodhead's Manual.

Briefly the arrangement of the book is original but unsatisfactory. The style is laborious and the excess of definitions in many places gives the book a dictionary-like aspect. In some instances the routine enumeration of causes, etc., may be of value. The attempt to cover the science of medicine in a text-book of Pathology has resulted in chapters on Parasitology, Clinical Microscopy, Bacteriology, Immunity and Clinical Diagnosis thus crowding the portions on pathological anatomy with the result that this portion of the book is inadequate. Important, even if unsettled, problems are not discussed, and the newer literature has been overlooked.

After a careful study of the work we feel that there are better pathologies for students, and that it needs careful revision to make it not only useful, but to correct its errors and bring it up to date.

A Text-Book of Pharmacology and Therapeutics or the Action of Drugs in Health and Disease. By ARTHUR R. CUSHNY, M. A., M. D., F. R. S., etc. Fifth Edition. Thoroughly Revised. Illustrated. Price $3.75. (*Philadelphia and New York: Lea & Febiger, 1910.*)

The fourth edition of this work was reviewed in the May, 1906, number of this journal, and its admirable qualities were pointed out. This present edition is an improvement on the last for it is brought thoroughly up-to-date, and therefore it may be endorsed with all the warmth it received before, and recommended to students and practitioners as the best work in English on this subject.

The Diseases of Women. A Hand-Book for Students and Practitioners. By J. BLAND-SUTTON, F. R. C. S. Eng., etc., and ARTHUR E. GILES, M. D., F. R. C. S. Edin., etc. Sixth Edition. Illustrated. Price $3.25. (*New York: Rebman Company, 1910.*)

The success of this manual is deserved; it was warmly reviewed in this journal (April, 1907), and this edition is an improvement on the last, as new and important chapters have been added in "Injuries to the Uterus," "Fibrosis Uteri," "Adenomatous Disease of the Uterus," "Vermiform Appendix," and "Injuries to the Ureters." It is an art to write a good manual, of which the number is limited, and this is one of the best in any specialty.

Clinical Commentaries. Deduced from the Morphology of the Human Body. By PROFESSOR ACHILLE DE-GIOVANNI, Director of the General Medical Clinic, University of Padua. Translated from the Second Italian Edition by JOHN JOSEPH EYRE, M. R. C. P., etc. Part—General. Price $4.50. (*New York: Rebman Company, 1910.*)

That the morphology of the human body should be studied as a help both in physiology and pathology will be denied by no wise physician, but that these "Commentaries" can be correctly drawn from such a study is very doubtful. The chapter on the "Morphological Examination of the Heart" is very typical of the author's point of view, and so it is fair to make certain extracts to indicate his methods. On pages 221-224 is described how to mark out the cardiac triangle on the surface of the body—the description is vague, which is explained in the following statement (p. 224): "I have already said more than once that I have no faith in averages, and I have given my reasons. Hence I have considered it useless to give the figures which concern the length of the sides of the cardiac triangle." Morphology, if it is to be studied like other exact sciences, must deal with figures and averages. Some of the difficulty met with in understanding the

author may come from the very imperfect translation. On p. 225 occurs the following sentence: "The part which this contributes to forming the base and the apex naturally increases somewhat the proportion of the base and of the left ventricle; but at any rate in the maximal disproportion which refers to the right ventricle rests the criterion for concluding that the cause for the complexive enlargement of the heart is due both the right ventricle by reason of the entity of the disproportion of the side of the triangle which appertains to it." The author (p. 226), in italics, gives a method of measuring the fist and says if this is accurately taken "*one will have the measurement of the base of the heart.* This is a fact, not an opinion, ..." Throughout the work the author shows this unjustifiable (?) dogmatism. For instance, on page 96, we read "Following these conceptions, one comprehends that the external environment can modify the internal environment—that the diplococcus, for instance, of the saliva can become the penumococcus of pneumonia, and another the meningcoccus . . . ."

From the chapter on "*Fat and Panniculus Adiposus*" the following statements are taken: "and equally that the individuals in whom fat is produced beyond the ordinary amounts in some parts of their body demonstrate in these parts a morphological anomaly with a lymphatic character"; and further on "I have observed that in all ages the richness in fat coincides with a particular form of the body in which certain morphological relations that I shall indicate later on are always verified." One more quotation and we will close leaving it to those interested to decide as to whether the case is proven, as the author presents it, and whether so much can be deduced from morphology as he believes. "On the other hand, the growth of the trunk takes place less rapidly in the female sex than in the male, and this is in relationship with the great nervousness of females with scrofulous and rachitic constitutions. Without entering now into the discussion as to the importance of these ideas, it will be sufficient to state that we are dealing with the results of researches conducted without method [*sic*] with the sole object of finding averages [in which elsewhere the author has no faith], and not of forming series, according to the requirements of the morphological method, and that, notwithstanding this, from the results we see arise the importance which a new study of the vertebral column must have for recognizing the variations of its development in relationship with the whole of the body, including the medulla spinalis" (p. 157).

Vaccine Therapy—Its Theory and Practice. By R. W. ALLEN, M. D., B. S. (Lond.), etc. Third Edition. Price $2. (*Philadelphia: P. Blakiston's Son & Co., 1910.*)

The author states in his preface to this edition that "it has been completely rewritten and brought up to date." It has filled a want and been successful, and will doubtless continue to do so. We refer our readers to the very favorable notice of it which appeared in this BULLETIN in March, 1909.

Practical Obstetrics. By E. HASTINGS TWEEDY, P. R. C. P. I., and G. T. WRENCH, M. D. Second Edition. Price $5.50. (*London, Henry Frowde and Hodder & Stoughton, 1910.*)

The first edition of this work appeared in 1908 under the title of "Rotunda Practical Midwifery" and was reviewed in this journal in December, 1909. What was said of it then applies today. It is a mistake to have changed the title. "The chapters on the toxæmia of pregnancy, uterine inertia, and contracted pelvis have been rewritten." Some other changes have been made in the book, and it is now a smaller volume, although the number of pages remains the same.

BOOKS RECEIVED.

Oxford Medical Publications. A System of Syphilis. In Six Volumes. Edited by D'Arcy Power, M. B. Oxon., F. R. C. S. and J. Keogh Murphy, M. C. Cantab., F. R. C. S. With an Introduction by Sir Jonathan Hutchinson, F. R. S. Vol. IV. Syphilis of the Nervous System. By F. W. Mott, M. D., F. R. S., F. R. C. P. 1910. 8vo. 502 pages. Henry Frowde, London; Hodder & Stoughton, London.

Diseases of the Colon and Their Surgical Treatment. (Founded on the Jacksonian Essay for 1909.) By P. Lockhart Mummery, F. R. C. S. Eng., B. A., M. B., B. C. Cantab. Illustrated by colored and other plates, and numerous figures in the text, many of which are reproduced from the author's sketches. 1910. 8vo. 322 pages. John Wright and Sons, Ltd., Bristol; Simpkin, Marshall, Hamilton, Kent and Co., Ltd., London.

Light Therapeutics. A Practical Manual of Phototherapy for the Student and the Practitioner. With Special Reference to the Incandescent Electric-Light Bath. By J. H. Kellogg, M. D. 1910. 8vo. 217 pages. The Good Health Publishing Company, Battle Creek, Michigan.

Education in Sexual Physiology and Hygiene. A Physician's Message. By Philip Zenner. 1910. 16mo. 126 pages. The Robert Clarke Company, Cincinnati.

Treatises on Fistula in Ano, Hæmorrhoids and Clysters. By John Arderne, from an Early Fifteenth-Century Manuscript Translation. Edited, with introduction, notes, etc., by D'Arcy Power, F. R. C. S. Eng. 1910. 8vo. 156 pages. Published for the Early English Text Society, Kegan Paul, Trench Trübner & Co., Ltd., London; Henry Frowde, London and New York.

Progressive Medicine. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by Hobart Amory Hare, M. D., assisted by Leighton F. Appleman, M. D. Volume II. June, 1910. 8vo. 363 pages. Lea & Febiger, Philadelphia and New York.

The Vegetable Proteins. By Thomas B. Osborne, Ph. D. 1909. 8vo. 125 pages. [Monographs on Biochemistry. Edited by R. H. Aders Plimmer, D. Sc., and F. G. Hopkins, M. A., M. B., D. Sc., F. R. S.] Longmans, Green and Co., London, New York, Bombay and Calcutta.

The Practice of Midwifery. Being the Seventh Edition of Dr. Galabin's Manual of Midwifery. Greatly Enlarged and Extended. By Alfred Lewis Galabin, M. A., M. D. Cantab.; F. R. C. P. Lond.; and George Blacker, M. D., B. S. Lond.; F. R. C. S. Eng.; F. R. C. P. Lond. Illustrated with 503 engravings. 1910. 8vo. 1123 pages. The Macmillan Company, New York.

Medical Education in the United States and Canada. A Report to the Carnegie Foundation for the Advancement of Teaching. By Abraham Flexner. With an Introduction by Henry S. Pritchett, President of the Foundation. Bulletin No. 4. 1910. 4to. 346 pages. D. B. Updick, The Merrymount Press, Boston.

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International Clinics. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles. Edited by Henry W. Cattell, A. M., M. D. Volume II. Twentieth Series. 1910. 8vo. 304 pages. J. B. Lippincott Company, Philadelphia.

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Hand-Book of Electro-Therapeutics. By William James Dugan, M. D. With ninety-one illustrations. 1910. 8°. 242 pages. F. A. Davis Company, Philadelphia.

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A Treatise on Orthopedic Surgery. By Royal Whitman, M. D. Fourth edition, revised and enlarged. Illustrated with six hundred and one engravings. 1910. 8vo. 908 pages. Lea & Febiger, Philadelphia and New York.

Gynécologie Opératoire. Par Henri Hartmann. Avec 422 figures dans le texte dont 80 en couleur. 1911. 4to. 498 pages. G. Steinheil, Paris.

Hernia. Its Cause and Treatment. By R. W. Murray, F. R. C. S. Second edition. With 62 illustrations. 1910. 8vo. 184 pages. J. & A. Churchill, London.

Osteology and Syndesmology. By Howard A. Sutton, A. B., M. D. and Cecil K. Drinker, B. S. 1910. 8vo. 225 pages. P. Blakiston's Son & Co., Philadelphia.

Report on the Measures Taken Against Malaria in the Lahore (Mian Mir) Cantonment. By the Hon'ble Mr. R. Nathan, C. I. E., I. C. S., Lieutenant-Colonel H. B. Thornhill, C. I. E., I. A., and Major L. Rogers, M. D., F. R. C. P., F. R. C. S., I. M. S. 1909. 8vo. Fol. 55 pages. 1910. Superintendent Government Printing, Calcutta, India.

Proceedings of the Sixteenth Annual Convention of the American Society of Superintendents of Training Schools for Nurses. Held at New York, May 16 and 17, 1910, and in conjunction with the Associated Nurses' Alumnæ of the United States, in the auditorium in the Horace Mann School, May 18, 1910. 8vo. 234 pages. J. H. Furst Company, Baltimore.

Diseases of the Stomach and Upper Alimentary Tract. By Anthony Bassler, M. D. Copiously illustrated with numerous half-tone and line text-engravings and 56 full-page half-tone plates (with nearly 100 figures) plain and in colors, from original photographs and drawings. 1910. 8vo. 836 pages. F. A. Davis Company, Philadelphia.

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A Handbook of the Surgery of Children. By E. Kirmisson. Translated by J. Keogh Murphy, M. C. (Cantab.), F. R. C. S. 1910. 8vo. 822 pages.

A System of Syphilis. In Six Volumes. Edited by D'Arcy Power, M. B. Oxon., F. R. C. S., and J. Keogh Murphy, M. C. Cantab., F. R. C. S. With an Introduction by Sir Jonathan Hutchinson, F. R. S. Vols. V and VI. 1910. 8vo.

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Lippincott's New Medical Dictionary. A Vocabulary of the Terms used in Medicine and the Allied Sciences, with their Pronunciation, Etymology and Signification. By Henry W. Cattell, A. M. (Laf.), M. D. (U. of P.) Freely illustrated with figures in the text. 1910. 8vo. 1108 pages. J. B. Lippincott Company, Philadelphia and London.

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A Treatise on Diseases of the Eye. By John Elmer Weeks, M. D. With 528 engravings and 25 full-page plates in colors. 1910. 8vo. 944 pages. Lea & Febiger, New York and Philadelphia.

The Practice of Medicine. A Guide to the Nature Discrimination and Management of Disease. By A. O. J. Kelly, A. M., M. D. Illustrated. 1910. 8vo. 945 pages. Lea & Febiger, Philadelphia and New York.

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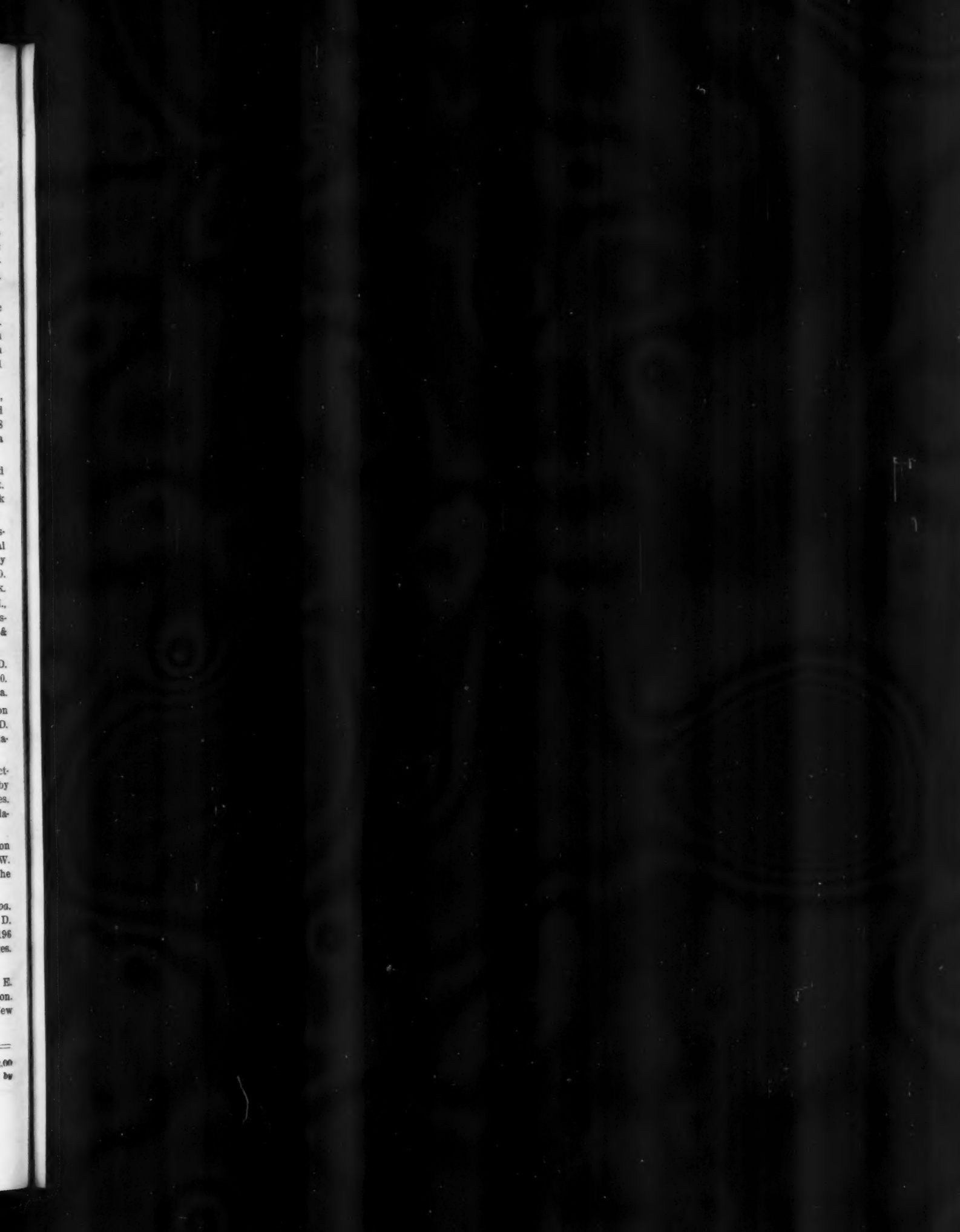
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